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CLAIMS

[Claim(s)]

[Claim 1]

In the switching equipment for intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned,

It has the first switch element and the second switch element,

Each of two traveling contacts of said first switch element is connected to the end side driving input of said direct current motor, and other end side driving input,

Two NO contacts of said first switch element are connected to said positive-electrode side power source,

Two NC contacts of said first switch element are connected to said negative-electrode side power source through NC contact of said second switch element,

And NC contact of said second switch element is maintained in the opening condition until NO contact of said first switch element begins to shift to an opening condition from close status and NC contact finishes shifting to close status from an opening condition.

Switching equipment characterized by things.

[Claim 2]

In the switching equipment for intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned,

It has the first switch element and the second switch element,

Each of two traveling contacts of said first switch element is connected to the end side driving input of said direct current motor, and other end side driving input,

Two NC contacts of said first switch element are connected to said negative-electrode side power source,

Two NO contacts of said first switch element are connected to said positive-electrode side power source through NC contact of said second switch element,

And before any one of the NO contacts of said first switch element shifts to an opening condition from close status, said NC contact of the second switch element which leads to the one NO contact concerned is changed into the opening condition.

Switching equipment characterized by things.

[Claim 3]

In the switching equipment for intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned,

It has the first switch element and the second switch element,

While connecting each of the end side driving input of said direct current motor, and other end side driving input to said positive-electrode side power source through each of two NO contacts of said first switch element,

Each of the end side driving input of said direct current motor and other end side driving input is connected to said negative-electrode side power source through each of two NC contacts of said second switch element,

And before any one of the NO contacts of said first switch element shifts to close status from an opening condition, said NC contact of the second switch element which leads to the one NO contact concerned is changed into the opening condition.

Switching equipment characterized by things.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention is applied to the direct current motor which operates with high supply voltage (electric system system of 42V system) especially about the switching equipment for performing the rotation and a halt of the direct current motor of an application similar to the direct current motor for window closing motion of cars, such as an automobile, or it, and relates to suitable switching equipment.

[0002]

[Description of the Prior Art]

Although the electric system system (supply voltage: 12V) of 14V system is adopted by present automobile, since the electronics device to carry is increasing, it is becoming the situation that covering power consumption with 14V system cannot be finished. That this should be canceled, as a result of having continued the argument globally by the consortium etc. [industry-university], consensus was obtained from the field of the safety to the body etc. by adopting the electric system system (supply voltage: 36V) of a 3 times as many high-voltage 42V System, i.e., a "system", as this.

[0003]

As electronic autoparts which operate by the electric system system of 42V system, there is a direct current motor for window closing motion (DC motor for the so-called power-window drive) built in the door, for example.

[0004]

Drawing 10 is structural drawing (a) of the conventional switching equipment for performing rotation (normal rotation and inversion) and a halt of the direct current motor for window closing motion, and its circuit diagram (b). This switching equipment 1 is attached in the armrest prepared inside the door of the front seat of a car, or a backseat. The condition of the switching equipment 1 of illustration shows the condition when DC motor 2 for a power-window drive (henceforth a "direct current motor") has stopped. That is, the condition when the knob 3 is not operated by the crew of a car is shown. Hereafter, this condition is called "neutral condition."

[0005]

The knob 3 is attached in the case 4 by the side of a door so that only a predetermined include angle can be rocked, respectively in the direction of a clockwise rotation and the direction of a counterclockwise rotation of a drawing. If a knob 3 is moved in the direction of a clockwise rotation, a window will be closed (henceforth "UP condition"), and if it moves in the direction of a counterclockwise rotation, a window will open (henceforth a "DOWN condition"). the operating physical force applied to the knob 3 -- canceling (a finger being lifted) -- by work of the spring 5 and plunger 6 which were embedded to the interior of a knob 3, it returns to a neutral condition and the neutral condition is maintained henceforth.

[0006]

When a knob 3 is in a neutral condition, it is in an illustration location, but the lower projection 7 of the knob 3 which extends inside a case 4 will be rocked leftward [of a drawing], if a knob 3 is changed into UP condition (refer to drawing 12 (a)), and if a knob 3 is changed into a DOWN condition, it will be rocked rightward [of a drawing] (illustration abbreviation).

[0007]

The switch unit 9 mounted in the printed circuit board 8 is formed in the interior of a case 4. This switch unit 9 functions as a switch of "2 Circuit 2 contact mold" of a mho noodle tally type, and that appearance etc. is shown in drawing 11. Two common terminals 11 and 12 by which the switch unit 9 was pulled out from one side face of a case 10, It solders to a circuit. the necessary conductor which was equipped with one normally open terminal 13 pulled out from the other side faces of a

case 10, and two normally closed terminals 14 and 15 pulled out from the base of a case 10, and was formed in the printed circuit board 8 in those terminals 11-15 -- By connecting with the power-source line (henceforth "+B line") 17, the ground line 18, and a direct current motor 2, the configuration of the circuit diagram of drawing 10 (b) is realized.

[0008]

As shown in drawing 10 (b), the switch mechanisms A and B for two circuits are mounted in the interior of a switch unit 9. These switch mechanisms A and B are exclusively switched according to the slide position of the slider 28 attached in the top face of a switch unit 9. In addition, switching" says "exclusion target here that only NC (normally closing) contact of B one [A or] switch mechanism will be in an opening condition (in other words only NO (normally open) contact of the switch mechanism should be in close status).

[0009]

When a slider 28 is in an illustration location, specifically, between the traveling contact 19 of 1st switch mechanism A and the NC contacts 23 and between the traveling contact 20 of 2nd switch mechanism B and the NC contacts 24 are close status (when it is in a "neutral condition"). Although the NO contacts 21 and 22 and the NC contacts 23 and 24 of 2 sets of switch mechanisms A and B will be in the condition as that identifier (NO-> normally open and NC -> normally closing) in this location When a slider 28 moves in the direction of the Hidari sense arrow head L in drawing, (when it is in "UP condition") While the close status between the traveling contact 20 of second switch mechanism B and the NC contact 24 is maintained The close status of the NC contact 23 of first switch mechanism A will be canceled, and between a traveling contact 19 and the NO contacts 21 will newly be in close status. Moreover, when a slider 28 moves in the direction of the rightward arrow head R in drawing, (when it is in a "DOWN condition") While the close status between the traveling contact 19 of first switch mechanism A and the NC contact 23 is maintained, the close status of the NC contact 24 of second switch mechanism B will be canceled, and between a traveling contact 20 and the NO contacts 22 will newly be in close status.

[0010]

Such a switching operation is caused by a motion of a slider 28 and the inferior-surface-of-tongue configuration of the slider 28. Drawing 11 (c) is the A-A sectional view of a slider 28, and drawing 11 (d) is the B-B sectional view of a slider 28. It is formed thickly, applying the A-A cross-section part of a slider 28 to the right half, and it is formed thickly, B-B cross-section applying [of a slider 28] it to the left half. Although it becomes clear also from the following explanation, according to the physical relationship of this thick part, the first switch mechanism A and second switch mechanism B are switched exclusively.

[0011]

In addition, in drawing 10 (a), only one side of common terminals 11 and 12 and one side of the normally closed terminals 14 and 15 are drawn. This is because each terminal is located in a line forward and backward toward the drawing, and is because a back terminal hides and is not visible to the shade of a front terminal.

[0012]

A switch unit 9 functions as a switch of "2 Circuit 2 contact mold" of a mho noodle tally type as explained also in advance. That is, traveling contacts 19 and 20, the NO contacts 21 and 22, and the NC contacts 23 and 24 have led to each of common terminals 11 and 12, the normally open terminal 13, and the normally closed terminals 14 and 15, and the contact change (the change between a traveling contact 19, the NO contact 21, and the NC contact 23 and change between a traveling contact 20, the NO contact 22, and the NC contact 24) of two circuits can be performed exclusively.

[0013]

Traveling contacts 19 and 20 are attached at the tip of the metal leaf-like movable pieces 25 and 26, and these metal leaf-like movable pieces 25 and 26 are energized by drawing down with push buttons 27A and 27B (for push button 27A, the thing for first switch mechanism A and push button 27B are a thing for second switch mechanism B). Push buttons 27A and 27B are in contact with the inferior surface of tongue of the slider 28 (refer to drawing 11) movable in a drawing longitudinal direction, and as shown in drawing 12 (a), they are respectively depressed caudad according to an individual with migration to the drawing left of a slider 28 in accordance with the inferior-surface-of-tongue configuration (thick section) of a slider 28. Moreover, the top-face projection 29 of a slider 28 is being engaged at the tip of the lower projection 7 of a knob 3, and a slider 28 follows in footsteps of rocking (UP condition and DOWN condition) to the longitudinal direction of the lower projection 7 of a knob 3, and it slides it to a drawing longitudinal direction.

[0014]

therefore -- if this switching equipment 1 pulls up a knob 3 and changes it into UP condition, while a slider 28 slides leftward, push button 27A which contacts the A-A cross-section thick section of a slider 28 carries out lower part migration and between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in an opening condition -- said -- operation that between the traveling contact 19 of first switch mechanism A and the NO contacts 21 will be in close status is acquired.

[0015]

Moreover, if a finger is lifted from a knob 3 and it changes into a neutral condition, a slider 28 will slide rightward, return and push button 27A will carry out upper part migration in the original location, and operation that between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status will be acquired.

[0016]

furthermore -- if a knob 3 is depressed and it changes into a DOWN condition, while a slider 28 slides rightward, push button 27B which contacts the B-B cross-section thick section of a slider 28 carries out lower part migration and between the traveling contact 20 of second switch mechanism B and the NC contacts 24 will be in an opening condition -- said -- operation that between the traveling contact 20 of second switch mechanism B and the NO contacts 22 will be in close status is acquired. Moreover, if a finger is lifted from a knob 3 and it changes into a neutral condition, a slider 28 will slide leftward, return and push button 27B will carry out upper part migration in the original location, and operation that between the traveling contact 20 of second switch mechanism B and the NC contacts 24 will be in close status will be acquired.

[0017]

In the circuit diagram of drawing 10 (b), when a knob 3 is in a neutral condition, each contact of the first switch mechanism A and second switch mechanism B is in the condition of illustration. That is, between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status, and between the traveling contact 20 of second switch mechanism B and the NC contacts 24 has become close status. In this condition, since connection between a direct current motor 2 and the +B line 17 is severed, a direct current motor 2 does not rotate.

[0018]

On the other hand, in the circuit diagram of drawing 12 (b), when a knob 3 is in UP condition, each contact of the first and the second switch mechanism A and B will be in the condition of illustration. That is, between the traveling contact 19 of first switch mechanism A and the NO contacts 21 will be in close status, and between the traveling contact 20 of second switch mechanism B and the NC contacts 24 has become close status. In this condition, since the closed circuit of the +B line 17 -> direct current motor 2 -> grand line 18 is formed, a direct current motor 2 rotates in the direction which shuts a window.

[0019]

Moreover, although illustration is omitted, when a knob 3 is in a DOWN condition, between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status, and between the traveling contact 20 of second switch mechanism B and the NO contacts 22 has become close status. In this condition, since the closed circuit of the circumference of the reverse of the grand line 18 -> direct current motor 2 -> +B line 17 is formed, a direct current motor 2 rotates in the direction in which a window is opened.

[0020]

In addition, although the above explanation showed the example which controls rotation of a direct current motor 2 by one switch unit 9, there is not only this but switching equipment of the type which enabled it to open and close the window of other seats (a passenger seat, backseat, etc.) from a driver's seat depending on a car.

[0021]

Drawing 13 is the circuit diagram. This circuit is constituted combining the switch unit 9 for driver's seats, and switch unit 9' for other seats, and can perform now rotation and a halt of a direct current motor 2 (direct current motor for window closing motion of other seats) also from a driver's seat not to mention other seats.

[0022]

Moreover, by the above-mentioned explanation, it is one terminal (while assigning common terminals 11 and 12 and the normally closed terminals 14 and 15) to each of traveling contacts 19 and 20 and the NC contacts 23 and 24. Although one terminal (normally open terminal 13) is assigned to the NO contacts 21 and 22 (that is, it has five terminals in all), not only in this for example the contact (the first and second switch mechanism A --) which leads to the grand line 18 as

shown in drawing 14 You may be the thing (what is equipped with four terminals in all) of the type which connects the NC contact 23 of B, and 24 comrades within a unit, pulls it out from one terminal 15a, and is connected to the grand line 18. Moreover, it considers as the configuration equipped with one circuit as a switch mechanism, and two of them may be used, putting them in order. In this case, it becomes six terminals in all.

[0023]

[Problem(s) to be Solved by the Invention]

as long as it applies to the electric system system of 14V original system, it is alike, and the conventional switching equipment (drawing 10 - drawing 14) explained above is set, and operates convenient. However, when it applies to the electric system system of 42V system, a high current flows between specific contacts at the time of the return in the neutral condition from UP condition, or the return in the neutral condition from a DOWN condition, and the trouble of giving a damage to the contact concerned is in it according to this current.

[0024]

Drawing 15 is the explanatory view of a contact damage. Drawing in case (a) is for example, in UP condition, drawing just before ["just before"] (b) returns to a neutral condition, and (c) are drawings when returning to a neutral condition. The point that the seal of approval of the high electrical potential difference (supply voltage of 42V system electric system system: 36V) is carried out to the +B line 17 has the difference with said conventional explanation.

[0025]

Now, as shown in (a), when it is in UP condition, the first NO contact 21 and traveling contact 19 of switch mechanism A are close status, and the second traveling contact 20 and NC contact 24 of switch mechanism B have become close status. Therefore, the closed circuit of the +B line 17 -> direct current motor 2 -> grand line 18 is formed, and a direct current motor 2 rotates in the direction which closes a window.

[0026]

Next, if a finger is lifted from a knob 3, as shown in (b), the close status of the NO contact 21 of first switch mechanism A and a traveling contact 19 is dispelled, and a traveling contact 19 will start migration to the direction of the NC contact 23, producing the small arc discharge 30 of tolerance between the NO contacts 21.

[0027]

And finally, as shown in (c), between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status, the supply voltage to a direct current motor 2 will be severed, and a direct current motor 2 will be in a idle state.

[0028]

if the conventional switch is used, since a contact gap is as small as about 0.5mm and cannot secure the arc discharge electrical potential difference of 42 V parts -- several -- the traveling contact 19 in the condition that the seal of approval of the electrical potential difference of V was carried out will be connected to the NC contact 23. according to the experiment of these artificers, pass the NC contact 23 from a traveling contact 19 at this time -- the grand line 18 -- a high current 31 (more than 100A) -- a short time (about 0.5ms) -- flow -- since like, the big discharge phenomenon 32 occurred between the NO contact 21 and the NC contact 23, and the failure of having give a damage (contact damage or contact destruction) to the first traveling contact 19 and NC contact 23 of switch mechanism A was discovered.

[0029]

Since existence of this failure bars the spread of 42V system electric system systems, it has the technical technical problem which must be solved as soon as possible in this point.

[0030]

In addition, making it correspond to the magnitude of supply voltage, and making a contact gap large as a general cure against arc discharge, is performed. a contact gap -- extending (about 4mm) -- it is because an arc discharge electrical potential difference can be enlarged, so it connects with the NC contact 23 in the condition that the traveling contact 19 has not required the electrical potential difference and a contact damage can be avoided. However, this cure is one side, and causes large enlargement of a switch unit, and it has the trouble of becoming mounted hindrance.

[0031]

Then, without causing large enlargement of a switch unit, even if it applies to high supply voltage, such as 42V system electric system system, this invention can avoid a contact damage and aims at offering the switching equipment which does not cause time lag increase of a contact change.

[0032]

[Means for Solving the Problem]

In the switching equipment for the switching equipment concerning invention according to claim 1 intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned Have the first switch element and the second switch element, and each of two traveling contacts of said first switch element is connected to the end side driving input of said direct current motor, and other end side driving input. Two NO contacts of said first switch element are connected to said positive-electrode side power source. Two NC contacts of said first switch element are connected to said negative-electrode side power source through NC contact of said second switch element. And it is characterized by maintaining NC contact of said second switch element in the opening condition until NO contact of said first switch element begins to shift to an opening condition from close status and NC contact finishes shifting to close status from an opening condition.

[0033]

In this invention, if the both sides of two NC contacts of the first switch element are made into close status, a negative-electrode side power source will be added to the both sides of the end side driving input of a direct current motor, and other end side driving input through that two contacts and NC contact of the second switch element, and a direct current motor will stop. Moreover, if only one side of two NC contacts of the first switch element is made into close status, while a negative-electrode side power source will be added to the end side driving input of a direct current motor through the contact and NC contact of the second switch element, a positive-electrode side power source is added to the other end side driving input of a direct current motor through the contact which would be in close status among two NO contacts of the first switch element, and a direct current motor rotates.

[0034]

Although a direct current motor shifts to a halt from rotation by on the other hand returning the contact which is close status among two NO contacts of the first switch element during rotation of a direct current motor to an opening condition At this time, NO contact of the first switch element begins to shift to an opening condition from close status. Since NC contact of the second switch element is maintained in the opening condition until NC contact finishes shifting to close status from an opening condition In the meantime, the current path between NC contact of the first switch element and a negative-electrode side power source is intercepted, generating of an instant high current is avoided, and contact damage prevention of the first switch element is achieved.

[0035]

In the switching equipment for the switching equipment concerning invention according to claim 2 intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned Have the first switch element and the second switch element, and each of two traveling contacts of said first switch element is connected to the end side driving input of said direct current motor, and other end side driving input. Two NC contacts of said first switch element are connected to said negative-electrode side power source. Two NO contacts of said first switch element are connected to said positive-electrode side power source through NC contact of said second switch element. And before any one of the NO contacts of said first switch element shifts to an opening condition from close status, it is characterized by changing into an opening condition said NC contact of the second switch element which leads to the one NO contact concerned.

[0036]

In this invention, if the both sides of two NC contacts of the first switch element are made into close status, a negative-electrode side power source will be added to the both sides of the end side driving input of a direct current motor, and other end side driving input through those two contacts, and a direct current motor will stop. Moreover, if only one side of two NC contacts of the first switch element is made into close status, while a negative-electrode side power source will be added to the end side driving input of a direct current motor through the contact, a positive-electrode side power source is added to the other end side driving input of a direct current motor through the contact and NC contact of the second switch element which would be in close status among two NO contacts of the first switch element, and a direct current motor rotates.

[0037]

Although a direct current motor shifts to a halt from rotation by on the other hand returning the contact which is close status among two NO contacts of the first switch element during rotation of a direct current motor to an opening condition Since NC contact of the second switch element which

leads to the one NO contact concerned is changed into the opening condition before NO contact of the first switch element shifts to an opening condition from close status at this time The current path between NO contact of the first switch element and a positive-electrode side power source is intercepted, generating of an instant high current is avoided, and contact damage prevention of the first switch element is achieved.

[0038]

In the switching equipment for the switching equipment concerning invention according to claim 3 intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned While having the first switch element and the second switch element and connecting each of the end side driving input of said direct current motor, and other end side driving input to said positive-electrode side power source through each of two NO contacts of said first switch element Each of the end side driving input of said direct current motor and other end side driving input is connected to said negative-electrode side power source through each of two NC contacts of said second switch element. And before any one of the NO contacts of said first switch element shifts to close status from an opening condition, it is characterized by changing into an opening condition said NC contact of the second switch element which leads to the one NO contact concerned.

[0039]

In this invention, if the both sides of two NC contacts of the second switch element are made into close status while changing the both sides of two NO contacts of the first switch element into an opening condition, a negative-electrode side power source will be added to the both sides of the end side driving input of a direct current motor, and other end side driving input through two NC contacts of the second switch element, and a direct current motor will stop. Moreover, if NC contact of the second switch element which leads to the NC contact is changed into an opening condition while making one side of two NO contacts of the first switch element into close status, while a negative-electrode side power source will be added to the end side driving input of a direct current motor through those close status contacts, a positive-electrode side power source is added to other end side driving input, and a direct current motor rotates.

[0040]

On the other hand, although a direct current motor shifts to a halt from rotation by returning NC contact of the second switch element which leads to the NC contact to close status while returning one side of two NO contacts of the first switch element to an opening condition during rotation of a direct current motor Since NC contact of the second switch element which leads to the one NO contact concerned is returned to close status before NO contact of the first switch element shifts to an opening condition from close status at this time Arc discharge electrical potential difference sufficient at NO contact of the first switch element is securable, even if NC contact of the second switch which leads to the one NO contact concerned will be in close status, generating of an instant high current is avoided, and contact damage prevention of the first switch element is achieved.

[0041]

[Embodiment of the Invention]

Hereafter, the gestalt of operation of this invention is explained based on a drawing.

<The gestalt of operation concerning invention according to claim 1>

First, the gestalt (henceforth "the gestalt of the 1st operation") of operation concerning invention according to claim 1 is explained in detail.

Drawing 1 is the important section block diagram of the switching equipment 40 in the gestalt of this operation. Switching equipment 40 is roughly divided and consists of two switch elements (the first switch element 41 and 2nd switch element 42) and a switching actuation element 43 which performs switching actuation of these two switch elements 41 and 42.

[0042]

It explains for every element. First, the first switch element 41 has the fixed electrodes 41a-41f of six sheets which consist of a plate-like (or thin film formation was carried out) metallic conductor inserted to the non-illustrated shaping base, and two movable pieces 41g and 41h. The fixed electrodes 41a-41f of six sheets are right conductivity, and are made from metallic materials (alloy of copper, brass and copper, and iron etc.) strong against wear, they make three sheets a lot and each class is arranged side by side in parallel. The first group consists of fixed electrodes 41a-41c, and the second group consists of the remaining fixed electrodes 41d-41f.

[0043]

here -- the size relation of the surface area of six fixed electrodes 41a-41f -- the surface area of fixed electrode 41a -- it is as follows when D41e and surface area of 41f of fixed electrodes are set [the

surface area of D41a and fixed electrode 41b / the surface area of D41b and fixed electrode 41c / D41c and the surface area of 41d of fixed electrodes] to D41f for the surface area of D41d and fixed electrode 41e.

[0044]

D41 a=D41d,

D41b=D41e -- and

D41c=D41f

[0045]

The fixed electrodes 41a-41c of the first group are arranged in the direction of Hidari from the right of a drawing along with the virtual axis 44 in order of fixed electrode 41a, fixed electrode 41b, and fixed electrode 41c, and the fixed electrodes 41d-41f of the second group are arranged in the direction of the right from Hidari of a drawing along with the virtual axis 44 in order of 41d of fixed electrodes, fixed electrode 41e, and 41f of fixed electrodes.

[0046]

Spacing L2a of fixed electrode 41b and fixed electrode 41c is smaller than fixed electrode 41a and spacing L1a of fixed electrode 41b, and spacing L2b of fixed electrode 41e and 41f of fixed electrodes is smaller than spacing L1b of 41d of fixed electrodes, and fixed electrode 41e similarly. They are L1 a=L1b and L2 a=L2b here.

[0047]

Two movable pieces 41g and 41h have the suitable configuration which can slide along with the virtual axis 44 for the fixed electrode [of the first group] a [41]-41c, and fixed electrode [41]-41f top of the second group, respectively. For example, two movable pieces 41g and 41h have on the base the configuration which has two curve projection 41g_1 and 41g_2 (1 movable piece if it is in 41h 41h_ 2), respectively, and the whole is right conductivity and they are made from metallic materials (alloy of copper, brass and copper, and iron etc.) strong against wear.

[0048]

Two movable pieces 41g and 41h are energized downward with Springs 41i and 41j, respectively. And two curve projection 41g_1 of two movable pieces 41g and 41h and 41g_2 (1 movable piece if it is in 41h 41h_ 41h_ 2) are forced by the energization force on the fixed electrodes 41a-41c of the first group, and the fixed electrodes 41d-41f of the second group, respectively.

[0049]

Moreover, two spacing of two movable pieces 41g and 41h, curve projection 41g_1 and 41g_2 (1 movable piece if it is in 41h 41h_ 41h_ 2) It is set up more greatly than the aforementioned L1a (L1b). Specifically If 41g of one movable pieces is made into an example, between these two metallic conductors can be made into close status only in contact with the both sides of fixed electrode 41a of the first group, and fixed electrode 41b. And it is set as suitable spacing which can make between these two metallic conductors close status only in contact with the both sides of fixed electrode 41b of the first group, and fixed electrode 41c.

[0050]

In addition, the necessity which the "whole" is right conductivity, and is made from a metallic material strong against wear does not have two movable pieces 41g and 41h. What is necessary is in short, to be able to make between these two metallic conductors into close status only in contact with the both sides of fixed electrode 41a of the first group, and fixed electrode 41b, and just to be able to make between these two metallic conductors into close status only in contact with the both sides of fixed electrode 41b of the first group, and fixed electrode 41c, in case it moves along with the virtual axis 44 (if for 41g of one movable pieces to be made into an example).

[0051]

For example, while _ of 41g of two curve projections formed in each base 1 or 41g_2 (1 movable piece if it is in 41h 41h_ 41h_ 2) itself or its front face has well-conductivity and abrasion resistance Between two curve projection 41g_1 and 41g_2 (1 movable piece if it is in 41h 41h_ 41h_ 2) may be connected electrically.

[0052]

Two movable pieces 41g and 41h move leftward [of a drawing / the right or leftward] along with the virtual axis 44 by work of the switching actuation element 43 mentioned later each, always maintaining the concurrency condition of illustration.

[0053]

Therefore, according to the first switch element 41 which has such a configuration When there are two movable pieces 41g and 41h in an illustration location (henceforth a "neutral condition"), curve projection 41g_1 of 41g of one movable pieces and 41g_2 Since the both sides of fixed electrode 41b

of the first group and fixed electrode 41c are contacted those conductors -- while being able to make between into close status -- the movable piece of another side -- since curve projection 41h_1 [41h] and 41h_2 contact the both sides of fixed electrode 41e of the second group, and 41f of fixed electrodes -- those conductors -- between can be made into close status. While in other words being able to make between fixed electrode 41a of the first group, and fixed electrode 41b into an opening condition in this case, between 41d of fixed electrodes of the second group and fixed electrode 41e can be made into an opening condition.

[0054]

a movable piece -- the case where 41g moves rightward [of a drawing] from a neutral condition -- the movable piece -- since curve projection 41g_1 [41g] and 41g_2 contact the both sides of fixed electrode 41a of the first group, and fixed electrode 41b -- those conductors -- if between can be made into close status and put in another way, between fixed electrode 41b of the first group and fixed electrode 41c can be made into an opening condition.

[0055]

At this time, although 41h of movable pieces of another side moves rightward [of a drawing] from a neutral condition at coincidence, curve projection 41h_1 of 41h of that movable piece and 41h_2 are leaving close status the fixed electrodes 41f and 41e of the second group.

[0056]

moreover -- the same -- a movable piece -- the case where 41h moves leftward [of a drawing] from a neutral condition -- the movable piece -- since curve projection 41h_1 [41h] and 41h_2 contact 41d of fixed electrodes of the second group, and the both sides of fixed electrode 41e -- those conductors -- if between can be made into close status and put in another way, between fixed electrode 41e of the second group and 41f of fixed electrodes can be made into an opening condition.

[0057]

At this time, although 41g of movable pieces of another side moves leftward [of a drawing] from a neutral condition at coincidence, curve projection 41g_1 of 41g of that movable piece and 41g_2 are leaving close status the fixed electrodes 41c and 41b of the first group.

[0058]

The C section of the lower left in drawing expresses the first switch element 41 with a circuit diagram. In this circuit diagram, the movable pieces 41g and 41h and fixed electrodes 41b and 41e form two traveling contacts of a publication in the summary of invention. Moreover, fixed electrodes 41a and 41d form NO contact given in this summary, respectively, and fixed electrodes 41c and 41f form NC contact of a publication in this summary, respectively.

[0059]

When the movable pieces 41g and 41h are in the neutral condition of illustration, NC contact (41c, 41f) is close status. Moreover, if the close status of NC contact (41c) will be dispelled, NO contact (41a) will be in close status, if 41g of one movable pieces moves rightward along with the virtual axis 44 from a neutral condition, and 41h of movable pieces of another side moves leftward along with the virtual axis 44 from a neutral condition, the close status of NC contact (41f) will be dispelled, and NO contact (41d) will be in close status.

[0060]

This first switch element 41 is what functions as a switch of "circuit 4 contact 2 Mold". That is, by work of the below-mentioned switching actuation element 43 If the movable pieces [41g and 41h] centering location is changed into the neutral condition of illustration, it will set in this neutral condition. Two of four fixed electrodes 41a, 41c, 41d, and 41f located in right-and-left both the side (41c, 41f) become NC (normally closing) contact, and the two (41a, 41d) remaining become NO (normally open) contact.

[0061]

Next, the second switch element 42 is explained. This second switch element 42 mounts 2 sets of switch mechanisms of the same structure which consists of the following members on the same base substrate (un-illustrating) as the first above-mentioned switch element 41, and is constituted.

[0062]

Namely, the U character-like members 42a and 42b by which the second switch element 42 was set up on the above-mentioned base substrate, The metal leaf-like movable pieces 42c and 42d which had the end held to the U character-like members 42a and 42b, The traveling contacts 42e and 42f attached in the metal leaf-like movable pieces [42c and 42d] other end, It is constituted including the inverse L-shaped members 42g and 42h set up on the above-mentioned base substrate, and the stationary contacts 42i and 42j attached in the inverse L-shaped members [42g and 42h] downward edge.

[0063]

the metal leaf-like movable pieces 42c and 42d incurvated the notching sections 42k and 42m formed in that part, were attached to the U character-like members 42a and 42b, and are applied, these notching sections [42k and 42m] repulsive force is used, and the traveling contacts 42e and 42f attached in the other end are always contacted to stationary contacts 42i and 42j (it is made close status) -- it is like. Therefore, stationary contacts 42i and 42j function as an NC (normally closing) contact.

[0064]

Moreover, if downward external force (force exceeding notching sections [42k and 42m] repulsive force) is applied to the metal leaf-like movable pieces 42c and 42d through the push buttons 42n and 42p respectively prepared according to the individual A metal leaf-like movable pieces [42c and 42d] tip falls, the contact between traveling contacts 42e and 42f and stationary contacts 42i and 42j (close status) is canceled, and between those contacts is made into an opening condition.

[0065]

The D section on drawing Nakamigi expresses the second switch element 42 with a circuit diagram. In this circuit diagram, two traveling contacts 42e and 42f are in close status among stationary contacts (NC contact) 42i and 42j, respectively. If downward external force is now applied to one metal leaf-like movable piece 42c, the close status of traveling contact 42e and stationary contact (NC contact) 42i is canceled, and those contacts will be in an opening condition. Similarly, if downward external force is applied to 42d of metal leaf-like movable pieces of another side, close status with 42f of traveling contacts and stationary contact (NC contact) 42j is canceled, and those contacts will be in an opening condition.

[0066]

Therefore, this second switch element 42 functions as a switch of "2 Circuit 2 contact mold" which has NC contact (42i, 42j) of a pair.

[0067]

Next, the switching actuation element 43 is explained. The switching actuation element 43 shown with a wavy line for convenience among drawing has the following functions 1-4.

[0068]

<Function 1>

When there is no actuation input (for example, UP actuation and DOWN actuation of the knob 3 explained at the beginning) by an operator etc., the first switch element 41 and the second switch element 42 can be maintained in the neutral condition of illustration.

[0069]

<Function 2>

It can return to the neutral condition of illustration of the first switch element 41 and the second switch element 42 immediately after discharge of the actuation input by an operator etc.

[0070]

<Function 3>

While you answer the actuation input (for example, UP actuation) of 1 by an operator etc. and you can move to an one direction (for example, left of a drawing) along with the virtual axis 44 from the neutral condition of illustration of the movable piece of 1 of the first switch element 41 (for example, a movable piece 41h), one NC contact (for example, stationary contact 42j) of the second switch element 42 should change into an opening condition.

[0071]

<Function 4>

While you answer other actuation inputs (for example, DOWN actuation) by an operator etc. and you can move in the other directions (for example, right of a drawing) along with the virtual axis 44 from the neutral condition of illustration of other movable pieces (for example, a movable piece 41g) of the first switch element 41, NC contact (for example, stationary contact 42i) of another side of the second switch element 42 should change into an opening condition.

[0072]

Drawing 2 and drawing 3 are the functional description Figs. of the switching actuation element 43. In drawing 2, the switching actuation element 43 has actuation means 43a of a slider 28 and similar structure in conventional switching equipment. This actuation means 43a is slid to the longitudinal direction of a drawing, following in footsteps of a motion [the knob 3 in conventional switching equipment] (UP condition <- -> neutral condition <- -> DOWN condition), and meeting the virtual axis 44 (the same thing as the virtual axis 44 of drawing 1).

[0073]

And if this actuation means 43a moves to an one direction (it considers as the left of a drawing hereafter) along with the virtual axis 44 While one movable piece (it considers as 41h of movable pieces hereafter) of the first switch element 41 will move leftward [of a drawing] along with the virtual axis 44 from the neutral condition of illustration and between 41d-41f of fixed electrodes e will be in close status NC contact (hereafter referred to as stationary-contact 42j) of another side of the second switch element 42 will be in an opening condition.

[0074]

Furthermore, if actuation means 43a slides leftward, stationary-contact 42j will be in close status, and the open direction rotation drive function of the direct current motor for window closing motion will be realized. Therefore, these intervention contacts (41h, 41d, 41e, 42j) constitute a rise side motor drive switch group (UP switch group) as one.

[0075]

Moreover, if this actuation means 43a moves in the other directions (it considers as the right of a drawing hereafter) along with the virtual axis 44 While other movable pieces (it considers as 41g of movable pieces hereafter) of the first switch element 41 will move rightward [of a drawing] along with the virtual axis 44 from the neutral condition of illustration and between fixed electrode 41a-41b will be in close status NC contact (hereafter referred to as stationary-contact 42i) of another side of the second switch element 42 will be in an opening condition.

[0076]

Furthermore, if actuation means 43a slides rightward, stationary-contact 42i will be in close status, and the closed direction rotation drive function of the direct current motor for window closing motion will be realized. Therefore, these intervention contacts (41g, 41a, 41b, 42i) constitute a down side motor drive switch group (DOWN switch group) as one.

[0077]

In drawing 3, this drawing is one switch group's (it considers as the expedient top of explanation, and UP switch group) explanatory view of operation. The X-X cross section and the Y-Y cross section show the fracture surface in drawing 2 . About the first line expresses the neutral condition of an initial valve position. In the state of this neutrality, 41h of movable pieces of the first switch element 41 is located between central fixed electrode 41e and 41f of right end fixed electrodes, and they make between these two electrodes close status. Moreover, push button 42p of the second switch element 42 is in the condition of having carried out checking and verifying to the inferior-surface-of-tongue crevice of actuation means 43a, and having been raised in it, it is not reversed caudad and 42d of metal leaf-like movable pieces is in close status between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces, and stationary-contact 42j.

[0078]

If it shifts to UP condition from this condition (the shift to left of actuation means 43a is started), it will set about to the second line immediately after UP condition shift first. Although 41h of movable pieces of the first switch element 41 is located in the location of the first above-mentioned stroke between continuation, i.e., central fixed electrode 41e, and 41f of right end fixed electrodes and between these two electrodes is made into close status Since push button 42p of the second switch element 42 shifted to the thick section, and will be depressed from the inferior-surface-of-tongue crevice of actuation means 43a and 42d of metal leaf-like movable pieces is bent caudad, The close status between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces and stationary-contact 42j is canceled, and it will be in an opening condition.

[0079]

Subsequently, if UP condition progresses further and it goes about into the third line, they will change between central fixed electrode 41e and 41f of right end fixed electrodes into an opening condition while 41h of movable pieces of the first switch element 41 is located between fixed electrode 41e of 41d of left end fixed electrodes, and a center and they make between these two electrodes close status. At this time, push button 42p of the second switch element 42 has still shifted to the thick section from the inferior-surface-of-tongue crevice of actuation means 43a, and since the condition that 42d of metal leaf-like movable pieces was reversed caudad is maintained, the opening condition is maintained between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces, and stationary-contact 42j.

[0080]

And although 41h of movable pieces of the first switch element 41 is located in the location of the third above-mentioned stroke between continuation, i.e., fixed electrode 41e of 41d of left end fixed electrodes, and a center, and between these two electrodes is made into close status if UP condition progresses further and a last line goes about into (the fourth line) Push button 42p of the second

switch element 42 carried out checking and verifying to the inferior-surface-of-tongue crevice of actuation means 43a, and will be raised in it. 42d of metal leaf-like movable pieces will return horizontally, and between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces and stationary contact 42j will be in close status.

[0081]

In addition, although explanation of drawing 3 showed the shift process from a neutral condition to "UP condition", its same is said of the shift process to a "DOWN condition." In the case of the shift process to a "DOWN condition", it is each sign under above-mentioned explanation,

41h -> 42g

41d->41a

41e->41b

41f->41c

42d->42c

42j->42i

42f->42e

42p->42n

What is necessary is just to read.

[0082]

Drawing 4 is rotation (normal rotation and inversion) of the direct current motor for window closing motion constituted with the application of the switching equipment 40 of the gestalt of this operation, and the circuit diagram of a halt system. In this drawing, it is conventionally different from a system in that the +B line 17 is a positive-electrode side power source (+B line of the electric system system for cars), and the applied voltage of the +B line 17 is a high voltage (supply voltage: 36V), for example, the thing of 42V system electric system system, from 14V system electric system system although the grand line 18 is a negative-electrode side power source (grand line of this system).

[0083]

In drawing 4, drawing when drawing in case (a) is for example, in a DOWN condition, and (d) return to a neutral condition from a DOWN condition, (b), and (c) are drawings when being in the middle transient. When it is in a DOWN condition, each contact of the first switch element 41 and the second switch element 42 is in the condition about corresponding to the fourth line of drawing 3. That is, while between the movable piece (41g) of the first switch element 41 and NO contacts (41a) and between a movable piece (41h) and NC contacts (41f) are close status, two NC contacts (42i, 42j) of the second switch element 42 are close status.

[0084]

For this reason, since the potential (0V) of the grand line 18 is applied to the other end side driving input of a direct current motor 2 while the potential (+42V) of the +B line 17 is applied to the end side driving input of a direct current motor 2, a direct current motor 2 rotates to an one direction (direction which opens a window).

[0085]

In this condition, if a DOWN condition is canceled (i.e., if a finger is lifted from the knob 3 explained at the beginning), it will shift to the condition of drawing 4 (b). In this condition, although the contact of the first switch element 41 remains as it is, both two NC contacts (42i, 42j) of the second switch element 42 will be in an opening condition, and connection between the end side driving input of a direct current motor 2 and the grand line 18 will be severed.

[0086]

Next, while the movable piece (41g) of the first switch element 41 and the close status between NO contacts (41a) are dispelled shifting to the condition of drawing 4 (c) and maintaining the opening condition of two NC contacts (42i, 42j) of the second switch element 42, between a movable piece (41g) and NC contacts (41c) will be in close status.

[0087]

And finally, it will shift to the condition of drawing 4 (d), both two NC contacts (42i, 42j) of the second switch element 42 will be in close status, the grand line 18 is connected to the driving input by the side of the end of a direct current motor 2, and the other end, and rotation of a direct current motor 2 stops.

[0088]

now, un-arranging [of the conventional technique explained at the beginning] -- a direct current motor 2 -- the neutral condition from UP condition -- or when making it return to a neutral condition from a DOWN condition, it suited a high current flowing into the contact concerned with

the change of a contact, and causing a contact damage. In the gestalt of this operation, since the second switch element 42 is changed into an opening condition and the path of the high current concerned was intercepted to coincidence before switching the contact of the first switch element 41 or, this high current does not flow in and the contact damage of the first switch element 41 can be avoided. Although breadth incidentally becomes large a little in order to add two circuits of NC contacts, since it is not necessary to extend a contact gap, neither large enlargement of switching equipment 40 nor aggravation of responsibility is also caused. Furthermore, it is also possible to utilize for the increment in a contact gap the tooth space which wrote the second switch element 42 as NC contact, and had NO contact.

[0089]

In addition, with the gestalt of the above operation, although the second switch element 42 is made into the thing of "circuit 2 contact 2 Mold", it is not limited to this. You may be the thing of "circuit 1 contact 1 Mold."

[0090]

Drawing 5 is a circuit diagram at the time of using the second switch element 42 as "1 Circuit 1 contact mold." The difference with the gestalt of said operation connects two NC contacts (41c, 41f) of the first switch element 41 inside a switch, and is in the point connected to the grand line 18 through one movable piece (42e or 42f) of the second switch element 42, and one NC contact (42i or 42j).

[0091]

<The gestalt of operation concerning invention according to claim 2>

Or the second switch element 42 of "circuit 2 contact 2 Mold" may be connected to a positive-electrode side power source. Drawing 6 is the circuit diagram. The difference with the gestalt of said operation While making one the second movable piece (42e) and NC contact (42i) of the switch element 42 intervene between one NO contact (41a) of the first switch element 41, and the +B line 17 It is in the point of having made the second movable piece (42f) and NC contact (42j) of another side of the switch element 42 intervening between NO contact (41d) of another side of the first switch element 41, and the +B line 17.

[0092]

Or it is good also considering the second switch element 42 in drawing 6 as "1 A circuit 1 contact mold." Drawing 7 is the circuit diagram, and the difference with drawing 6 connects two NC contacts (41c, 41f) of the first switch element 41 inside a switch, and is in the point connected to the +B line 17 through one traveling contact (42e or 42f) of the second switch element 42, and one NC contact (42i or 42j).

[0093]

In any case (drawing 6 or drawing 7), before any one of the NO contacts (41a, 41d) of the first switch element 41 shifts to an opening condition from close status, said NC contact (42i, 42j) of the second switch element 42 which leads to the one NO contact concerned should just be changed into the opening condition. Since it moreover is not necessary to intercept the path of a high current, to avoid the contact damage of the first switch element 41, and to extend a contact gap, neither enlargement of switching equipment nor aggravation of responsibility is also caused.

[0094]

<The gestalt of operation concerning invention according to claim 3>

Or it is good also considering the first switch element 41 as "4 A circuit 4 contact mold." Drawing 8 is the circuit diagram. The difference with the gestalt of said operation The point of having excluded two NC contacts (41c, 41f) of the first switch element 41, The point of having enabled it to connect alternatively the end side driving input of a direct current motor 2, and other end side driving input to the +B line 17 through two NO contacts (41a, 41h) of the first switch element 41, And it is in the point of having enabled it to connect alternatively the end side driving input of a direct current motor 2, and other end side driving input to the grand line 18 through two NC contacts (42i, 42j) of the second switch element 42. What is necessary is just to change into the opening condition NC contact (42i, 42j) of the second switch element 42 which leads to the NO contact, before making those NO contacts (41a, 41h) into close status in order to avoid the damage of NO contact (41a, 41h) of the first switch element 41.

[0095]

Gestalt [of operation of others / <] >

Or with the gestalt of each above-mentioned operation, although unitization of the first switch element 41 and the second switch element 42 is carried out to one, the thought of this invention is not limited to this mode. For example. The first unit 51 which dedicated the first switch element 41

as shown in drawing 9, the second unit 52 which dedicated the second switch element 42 -- annexing -- the switch control unit (if it is in the first unit 51 -- up projection 51b of slider 51a --) of each units 51 and 52 If it is in the second unit 52, two crevices 50a and 50b of a knob 50 (thing equivalent to the knob 3 in said conventional technique) may be made to carry out the checking and verifying of the projection 52a for actuation.

[0096]

[Effect of the Invention]

According to invention according to claim 1 to 3, by making the contact of the second switch element into an opening condition to suitable timing, the path for which an instant high current flows can be intercepted, and the contact damage of the first switch element can be prevented. Therefore, the fault at the time of using for the car of high supply voltage like 42V system power-system system is cancelable.

[0097]

And since the preventive measure of this instant high current does not need expansion of a contact gap, neither enlargement of a switch unit nor aggravation of responsibility is also caused.

[Brief Description of the Drawings]

[Drawing 1] It is the important section block diagram of the switching equipment 40 in the gestalt of this operation.

[Drawing 2] It is the top view of the switching actuation element 43 (slider 43a).

[Drawing 3] It is one switch group's (UP switch group) explanatory view of operation.

[Drawing 4] They are rotation (normal rotation and inversion) of the direct current motor for window closing motion constituted with the application of the switching equipment 40 of the gestalt of this operation, and the circuit diagram of a halt system.

[Drawing 5] It is a circuit diagram at the time of using the second switch element 42 as "1 Circuit 1 contact mold."

[Drawing 6] It is a circuit diagram at the time of connecting the second switch element 42 of "circuit 2 contact 2 Mold" to a positive-electrode side power source.

[Drawing 7] It is a circuit diagram at the time of using the second switch element 42 as "1 Circuit 1 contact mold."

[Drawing 8] It is a circuit diagram at the time of using the first switch element 41 as "2 Circuit 2 contact mold."

[Drawing 9] It is an external view at the time of dedicating the first switch element 41 and the second switch element 42 to the unit according to individual.

[Drawing 10] They are structural drawing of conventional switching equipment, and its circuit diagram (thing at the time of a neutral condition).

[Drawing 11] They are the external view of a switch unit 9, the top view of a slider 28, and the sectional view of a slider 28.

[Drawing 12] They are structural drawing of conventional switching equipment, and its circuit diagram (thing at the time of UP condition).

[Drawing 13] It is the circuit diagram showing the switching equipment of the type which enabled it to open and close the window of other seats from a driver's seat.

[Drawing 14] It is the circuit diagram of the switching equipment equipped with four terminals in all.

[Drawing 15] It is the explanatory view of a contact damage.

[Description of Notations]

2 Direct Current Motor

17 +B Line (Positive-Electrode Side Power Source)

18 Grand Line (Negative-Electrode Side Power Source)

40 Switching Equipment

41 First Switch Element

41a and 41d Plate-like metallic conductor (NO contact)

41c and 41f Plate-like metallic conductor (NC contact)

41g and 41h Movable piece (traveling contact)

42 Second Switch Element

42i and 42j Stationary contact (NC contact)

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention]

This invention is applied to the direct current motor which operates with high supply voltage (electric system system of 42V system) especially about the switching equipment for performing the rotation and a halt of the direct current motor of an application similar to the direct current motor for window closing motion of cars, such as an automobile, or it, and relates to suitable switching equipment.

[0002]

[Translation done.]

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PRIOR ART

[Description of the Prior Art]

Although the electric system system (supply voltage: 12V) of 14V system is adopted by present automobile, since the electronics device to carry is increasing, it is becoming the situation that covering power consumption with 14V system cannot be finished. That this should be canceled, as a result of having continued the argument globally by the consortium etc. [industry-university], consensus was obtained from the field of the safety to the body etc. by adopting the electric system system (supply voltage: 36V) of a 3 times as many high-voltage 42V System, i.e., a "system", as this.

[0003]

As electronic autoparts which operate by the electric system system of 42V system, there is a direct current motor for window closing motion (DC motor for the so-called power-window drive) built in the door, for example.

[0004]

Drawing 10 is structural drawing (a) of the conventional switching equipment for performing rotation (normal rotation and inversion) and a halt of the direct current motor for window closing motion, and its circuit diagram (b). This switching equipment 1 is attached in the armrest prepared inside the door of the front seat of a car, or a backseat. The condition of the switching equipment 1 of illustration shows the condition when DC motor 2 for a power-window drive (henceforth a "direct current motor") has stopped. That is, the condition when the knob 3 is not operated by the crew of a car is shown. Hereafter, this condition is called "neutral condition."

[0005]

The knob 3 is attached in the case 4 by the side of a door so that only a predetermined include angle can be rocked, respectively in the direction of a clockwise rotation and the direction of a counterclockwise rotation of a drawing. If a knob 3 is moved in the direction of a clockwise rotation, a window will be closed (henceforth "UP condition"), and if it moves in the direction of a counterclockwise rotation, a window will open (henceforth a "DOWN condition"). the operating physical force applied to the knob 3 -- canceling (a finger being lifted) -- by work of the spring 5 and plunger 6 which were embedded to the interior of a knob 3, it returns to a neutral condition and the neutral condition is maintained henceforth.

[0006]

When a knob 3 is in a neutral condition, it is in an illustration location, but the lower projection 7 of the knob 3 which extends inside a case 4 will be rocked leftward [of a drawing], if a knob 3 is changed into UP condition (refer to drawing 12 (a)), and if a knob 3 is changed into a DOWN condition, it will be rocked rightward [of a drawing] (illustration abbreviation).

[0007]

The switch unit 9 mounted in the printed circuit board 8 is formed in the interior of a case 4. This switch unit 9 functions as a switch of "2 Circuit 2 contact mold" of a mho noodle tally type, and that appearance etc. is shown in drawing 11. Two common terminals 11 and 12 by which the switch unit 9 was pulled out from one side face of a case 10, It solders to a circuit. the necessary conductor which was equipped with one normally open terminal 13 pulled out from the other side faces of a case 10, and two normally closed terminals 14 and 15 pulled out from the base of a case 10, and was formed in the printed circuit board 8 in those terminals 11-15 -- By connecting with the power-source line (henceforth "+B line") 17, the grand line 18, and a direct current motor 2, the configuration of the circuit diagram of drawing 10 (b) is realized.

[0008]

As shown in drawing 10 (b), the switch mechanisms A and B for two circuits are mounted in the interior of a switch unit 9. These switch mechanisms A and B are exclusively switched according to the slide position of the slider 28 attached in the top face of a switch unit 9. In addition, switching" says "exclusion target here that only NC (normally closing) contact of B one [A or] switch

mechanism will be in an opening condition (in other words only NO (normally open) contact of the switch mechanism should be in close status).

[0009]

When a slider 28 is in an illustration location, specifically, between the traveling contact 19 of 1st switch mechanism A and the NC contacts 23 and between the traveling contact 20 of 2nd switch mechanism B and the NC contacts 24 are close status (when it is in a "neutral condition"). Although the NO contacts 21 and 22 and the NC contacts 23 and 24 of 2 sets of switch mechanisms A and B will be in the condition as that identifier (NO-> normally open and NC -> normally closing) in this location When a slider 28 moves in the direction of the Hidari sense arrow head L in drawing, (when it is in "UP condition") While the close status between the traveling contact 20 of second switch mechanism B and the NC contact 24 is maintained The close status of the NC contact 23 of first switch mechanism A will be canceled, and between a traveling contact 19 and the NO contacts 21 will newly be in close status. Moreover, when a slider 28 moves in the direction of the rightward arrow head R in drawing, (when it is in a "DOWN condition") While the close status between the traveling contact 19 of first switch mechanism A and the NC contact 23 is maintained, the close status of the NC contact 24 of second switch mechanism B will be canceled, and between a traveling contact 20 and the NO contacts 22 will newly be in close status.

[0010]

Such a switching operation is caused by a motion of a slider 28 and the inferior-surface-of-tongue configuration of the slider 28. Drawing 11 (c) is the A-A sectional view of a slider 28, and drawing 11 (d) is the B-B sectional view of a slider 28. It is formed thickly, applying the A-A cross-section part of a slider 28 to the right half, and it is formed thickly, B-B cross-section applying [of a slider 28] it to the left half. Although it becomes clear also from the following explanation, according to the physical relationship of this thick part, the first switch mechanism A and second switch mechanism B are switched exclusively.

[0011]

In addition, in drawing 10 (a), only one side of common terminals 11 and 12 and one side of the normally closed terminals 14 and 15 are drawn. This is because each terminal is located in a line forward and backward toward the drawing, and is because a back terminal hides and is not visible to the shade of a front terminal.

[0012]

A switch unit 9 functions as a switch of "2 Circuit 2 contact mold" of a mho noodle tally type as explained also in advance. That is, traveling contacts 19 and 20, the NO contacts 21 and 22, and the NC contacts 23 and 24 have led to each of common terminals 11 and 12, the normally open terminal 13, and the normally closed terminals 14 and 15, and the contact change (the change between a traveling contact 19, the NO contact 21, and the NC contact 23 and change between a traveling contact 20, the NO contact 22, and the NC contact 24) of two circuits can be performed exclusively.

[0013]

Traveling contacts 19 and 20 are attached at the tip of the metal leaf-like movable pieces 25 and 26, and these metal leaf-like movable pieces 25 and 26 are energized by drawing down with push buttons 27A and 27B (for push button 27A, the thing for first switch mechanism A and push button 27B are a thing for second switch mechanism B). Push buttons 27A and 27B are in contact with the inferior surface of tongue of the slider 28 (refer to drawing 11) movable in a drawing longitudinal direction, and as shown in drawing 12 (a), they are respectively depressed caudad according to an individual with migration to the drawing left of a slider 28 in accordance with the inferior-surface-of-tongue configuration (thick section) of a slider 28. Moreover, the top-face projection 29 of a slider 28 is being engaged at the tip of the lower projection 7 of a knob 3, and a slider 28 follows in footsteps of rocking (UP condition and DOWN condition) to the longitudinal direction of the lower projection 7 of a knob 3, and it slides it to a drawing longitudinal direction.

[0014]

therefore -- if this switching equipment 1 pulls up a knob 3 and changes it into UP condition, while a slider 28 slides leftward, push button 27A which contacts the A-A cross-section thick section of a slider 28 carries out lower part migration and between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in an opening condition -- said -- operation that between the traveling contact 19 of first switch mechanism A and the NO contacts 21 will be in close status is acquired.

[0015]

Moreover, if a finger is lifted from a knob 3 and it changes into a neutral condition, a slider 28 will slide rightward, return and push button 27A will carry out upper part migration in the original

location, and operation that between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status will be acquired.

[0016]

furthermore -- if a knob 3 is depressed and it changes into a DOWN condition, while a slider 28 slides rightward, push button 27B which contacts the B-B cross-section thick section of a slider 28 carries out lower part migration and between the traveling contact 20 of second switch mechanism B and the NC contacts 24 will be in an opening condition -- said -- operation that between the traveling contact 20 of second switch mechanism B and the NO contacts 22 will be in close status is acquired. Moreover, if a finger is lifted from a knob 3 and it changes into a neutral condition, a slider 28 will slide leftward, return and push button 27B will carry out upper part migration in the original location, and operation that between the traveling contact 20 of second switch mechanism B and the NC contacts 24 will be in close status will be acquired.

[0017]

In the circuit diagram of drawing 10 (b), when a knob 3 is in a neutral condition, each contact of the first switch mechanism A and second switch mechanism B is in the condition of illustration. That is, between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status, and between the traveling contact 20 of second switch mechanism B and the NC contacts 24 has become close status. In this condition, since connection between a direct current motor 2 and the +B line 17 is severed, a direct current motor 2 does not rotate.

[0018]

On the other hand, in the circuit diagram of drawing 12 (b), when a knob 3 is in UP condition, each contact of the first and the second switch mechanism A and B will be in the condition of illustration. That is, between the traveling contact 19 of first switch mechanism A and the NO contacts 21 will be in close status, and between the traveling contact 20 of second switch mechanism B and the NC contacts 24 has become close status. In this condition, since the closed circuit of the +B line 17 -> direct current motor 2 -> grand line 18 is formed, a direct current motor 2 rotates in the direction which shuts a window.

[0019]

Moreover, although illustration is omitted, when a knob 3 is in a DOWN condition, between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status, and between the traveling contact 20 of second switch mechanism B and the NO contacts 22 has become close status. In this condition, since the closed circuit of the circumference of the reverse of the grand line 18 -> direct current motor 2 -> +B line 17 is formed, a direct current motor 2 rotates in the direction in which a window is opened.

[0020]

In addition, although the above explanation showed the example which controls rotation of a direct current motor 2 by one switch unit 9, there is not only this but switching equipment of the type which enabled it to open and close the window of other seats (a passenger seat, backseat, etc.) from a driver's seat depending on a car.

[0021]

Drawing 13 is the circuit diagram. This circuit is constituted combining the switch unit 9 for driver's seats, and switch unit 9' for other seats, and can perform now rotation and a halt of a direct current motor 2 (direct current motor for window closing motion of other seats) also from a driver's seat not to mention other seats.

[0022]

Moreover, by the above-mentioned explanation, it is one terminal (while assigning common terminals 11 and 12 and the normally closed terminals 14 and 15) to each of traveling contacts 19 and 20 and the NC contacts 23 and 24. Although one terminal (normally open terminal 13) is assigned to the NO contacts 21 and 22 (that is, it has five terminals in all), not only in this for example the contact (the first and second switch mechanism A --) which leads to the grand line 18 as shown in drawing 14 You may be the thing (what is equipped with four terminals in all) of the type which connects the NC contact 23 of B, and 24 comrades within a unit, pulls it out from one terminal 15a, and is connected to the grand line 18. Moreover, it considers as the configuration equipped with one circuit as a switch mechanism, and two of them may be used, putting them in order. In this case, it becomes six terminals in all.

[0023]

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EFFECT OF THE INVENTION

[Effect of the Invention]

According to invention according to claim 1 to 3, by making the contact of the second switch element into an opening condition to suitable timing, the path for which an instant high current flows can be intercepted, and the contact damage of the first switch element can be prevented. Therefore, the fault at the time of using for the car of high supply voltage like 42V system power-system system is cancelable.

[0097]

And since the preventive measure of this instant high current does not need expansion of a contact gap, neither enlargement of a switch unit nor aggravation of responsibility is also caused.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]

as long as it applies to the electric system system of 14V original system, it is alike, and the conventional switching equipment (drawing 10 - drawing 14) explained above is set, and operates convenient. However, when it applies to the electric system system of 42V system, a high current flows between specific contacts at the time of the return in the neutral condition from UP condition, or the return in the neutral condition from a DOWN condition, and the trouble of giving a damage to the contact concerned is in it according to this current.

[0024]

Drawing 15 is the explanatory view of a contact damage. Drawing in case (a) is for example, in UP condition, drawing just before ["just before"] (b) returns to a neutral condition, and (c) are drawings when returning to a neutral condition. The point that the seal of approval of the high electrical potential difference (supply voltage of 42V system electric-system system: 36V) is carried out to the +B line 17 has the difference with said conventional explanation.

[0025]

Now, as shown in (a), when it is in UP condition, the first NO contact 21 and traveling contact 19 of switch mechanism A are close status, and the second traveling contact 20 and NC contact 24 of switch mechanism B have become close status. Therefore, the closed circuit of the +B line 17 -> direct current motor 2 -> grand line 18 is formed, and a direct current motor 2 rotates in the direction which closes a window.

[0026]

Next, if a finger is lifted from a knob 3, as shown in (b), the close status of the NO contact 21 of first switch mechanism A and a traveling contact 19 is dispelled, and a traveling contact 19 will start migration to the direction of the NC contact 23, producing the small arc discharge 30 of tolerance between the NO contacts 21.

[0027]

And finally, as shown in (c), between the traveling contact 19 of first switch mechanism A and the NC contacts 23 will be in close status, the supply voltage to a direct current motor 2 will be severed, and a direct current motor 2 will be in a idle state.

[0028]

if the conventional switch is used, since a contact gap is as small as about 0.5mm and cannot secure the arc discharge electrical potential difference of 42 V parts -- several -- the traveling contact 19 in the condition that the seal of approval of the electrical potential difference of V was carried out will be connected to the NC contact 23. according to the experiment of these artificers, pass the NC contact 23 from a traveling contact 19 at this time -- the grand line 18 -- a high current 31 (more than 100A) -- a short time (about 0.5ms) -- flow -- since like, the big discharge phenomenon 32 occurred between the NO contact 21 and the NC contact 23, and the failure of having give a damage (contact damage or contact destruction) to the first traveling contact 19 and NC contact 23 of switch mechanism A was discovered.

[0029]

Since existence of this failure bars the spread of 42V system electric system systems, it has the technical technical problem which must be solved as soon as possible in this point.

[0030]

In addition, making it correspond to the magnitude of supply voltage, and making a contact gap large as a general cure against arc discharge, is performed. a contact gap -- extending (about 4mm) -- it is because an arc discharge electrical potential difference can be enlarged, so it connects with the NC contact 23 in the condition that the traveling contact 19 has not required the electrical potential difference and a contact damage can be avoided. However, this cure is one side, and causes large enlargement of a switch unit, and it has the trouble of becoming mounted hindrance.

[0031]

Then, without causing large enlargement of a switch unit, even if it applies to high supply voltage, such as 42V system electric system system, this invention can avoid a contact damage and aims at offering the switching equipment which does not cause time lag increase of a contact change.

[0032]

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MEANS

[Means for Solving the Problem]

In the switching equipment for the switching equipment concerning invention according to claim 1 intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned Have the first switch element and the second switch element, and each of two traveling contacts of said first switch element is connected to the end side driving input of said direct current motor, and other end side driving input. Two NO contacts of said first switch element are connected to said positive-electrode side power source. Two NC contacts of said first switch element are connected to said negative-electrode side power source through NC contact of said second switch element. And it is characterized by maintaining NC contact of said second switch element in the opening condition until NO contact of said first switch element begins to shift to an opening condition from close status and NC contact finishes shifting to close status from an opening condition.

[0033]

In this invention, if the both sides of two NC contacts of the first switch element are made into close status, a negative-electrode side power source will be added to the both sides of the end side driving input of a direct current motor, and other end side driving input through that two contacts and NC contact of the second switch element, and a direct current motor will stop. Moreover, if only one side of two NC contacts of the first switch element is made into close status, while a negative-electrode side power source will be added to the end side driving input of a direct current motor through the contact and NC contact of the second switch element, a positive-electrode side power source is added to the other end side driving input of a direct current motor through the contact which would be in close status among two NO contacts of the first switch element, and a direct current motor rotates.

[0034]

Although a direct current motor shifts to a halt from rotation by on the other hand returning the contact which is close status among two NO contacts of the first switch element during rotation of a direct current motor to an opening condition At this time, NO contact of the first switch element begins to shift to an opening condition from close status. Since NC contact of the second switch element is maintained in the opening condition until NC contact finishes shifting to close status from an opening condition In the meantime, the current path between NC contact of the first switch element and a negative-electrode side power source is intercepted, generating of an instant high current is avoided, and contact damage prevention of the first switch element is achieved.

[0035]

In the switching equipment for the switching equipment concerning invention according to claim 2 intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned Have the first switch element and the second switch element, and each of two traveling contacts of said first switch element is connected to the end side driving input of said direct current motor, and other end side driving input. Two NC contacts of said first switch element are connected to said negative-electrode side power source. Two NO contacts of said first switch element are connected to said positive-electrode side power source through NC contact of said second switch element. And before any one of the NO contacts of said first switch element shifts to an opening condition from close status, it is characterized by changing into an opening condition said NC contact of the second switch element which leads to the one NO contact concerned.

[0036]

In this invention, if the both sides of two NC contacts of the first switch element are made into close status, a negative-electrode side power source will be added to the both sides of the end side driving

input of a direct current motor, and other end side driving input through those two contacts, and a direct current motor will stop. Moreover, if only one side of two NC contacts of the first switch element is made into close status, while a negative-electrode side power source will be added to the end side driving input of a direct current motor through the contact, a positive-electrode side power source is added to the other end side driving input of a direct current motor through the contact and NC contact of the second switch element which would be in close status among two NO contacts of the first switch element, and a direct current motor rotates.

[0037]

Although a direct current motor shifts to a halt from rotation by on the other hand returning the contact which is close status among two NO contacts of the first switch element during rotation of a direct current motor to an opening condition Since NC contact of the second switch element which leads to the one NO contact concerned is changed into the opening condition before NO contact of the first switch element shifts to an opening condition from close status at this time The current path between NO contact of the first switch element and a positive-electrode side power source is intercepted, generating of an instant high current is avoided, and contact damage prevention of the first switch element is achieved.

[0038]

In the switching equipment for the switching equipment concerning invention according to claim 3 intervening between a positive-electrode side power source and a negative-electrode side power source, and a direct current motor, and performing rotation and a halt of the direct current motor concerned While having the first switch element and the second switch element and connecting each of the end side driving input of said direct current motor, and other end side driving input to said positive-electrode side power source through each of two NO contacts of said first switch element Each of the end side driving input of said direct current motor and other end side driving input is connected to said negative-electrode side power source through each of two NC contacts of said second switch element. And before any one of the NO contacts of said first switch element shifts to close status from an opening condition, it is characterized by changing into an opening condition said NC contact of the second switch element which leads to the one NO contact concerned.

[0039]

In this invention, if the both sides of two NC contacts of the second switch element are made into close status while changing the both sides of two NO contacts of the first switch element into an opening condition, a negative-electrode side power source will be added to the both sides of the end side driving input of a direct current motor, and other end side driving input through two NC contacts of the second switch element, and a direct current motor will stop. Moreover, if NC contact of the second switch element which leads to the NC contact is changed into an opening condition while making one side of two NO contacts of the first switch element into close status, while a negative-electrode side power source will be added to the end side driving input of a direct current motor through those close status contacts, a positive-electrode side power source is added to other end side driving input, and a direct current motor rotates.

[0040]

On the other hand, although a direct current motor shifts to a halt from rotation by returning NC contact of the second switch element which leads to the NC contact to close status while returning one side of two NO contacts of the first switch element to an opening condition during rotation of a direct current motor Since NC contact of the second switch element which leads to the one NO contact concerned is returned to close status before NO contact of the first switch element shifts to an opening condition from close status at this time Arc discharge electrical potential difference sufficient at NO contact of the first switch element is securable, even if NC contact of the second switch which leads to the one NO contact concerned will be in close status, generating of an instant high current is avoided, and contact damage prevention of the first switch element is achieved.

[0041]

[Embodiment of the Invention]

Hereafter, the gestalt of operation of this invention is explained based on a drawing.

<The gestalt of operation concerning invention according to claim 1>

First, the gestalt (henceforth "the gestalt of the 1st operation") of operation concerning invention according to claim 1 is explained in detail.

Drawing 1 is the important section block diagram of the switching equipment 40 in the gestalt of this operation. Switching equipment 40 is roughly divided and consists of two switch elements (the first switch element 41 and 2nd switch element 42) and a switching actuation element 43 which performs switching actuation of these two switch elements 41 and 42.

[0042]

It explains for every element. First, the first switch element 41 has the fixed electrodes 41a-41f of six sheets which consist of a plate-like (or thin film formation was carried out) metallic conductor inserted to the non-illustrated shaping base, and two movable pieces 41g and 41h. The fixed electrodes 41a-41f of six sheets are right conductivity, and are made from metallic materials (alloy of copper, brass and copper, and iron etc.) strong against wear, they make three sheets a lot and each class is arranged side by side in parallel. The first group consists of fixed electrodes 41a-41c, and the second group consists of the remaining fixed electrodes 41d-41f.

[0043]

here -- the size relation of the surface area of six fixed electrodes 41a-41f -- the surface area of fixed electrode 41a -- it is as follows when D41e and surface area of 41f of fixed electrodes are set [the surface area of D41a and fixed electrode 41b / the surface area of D41b and fixed electrode 41c / D41c and the surface area of 41d of fixed electrodes] to D41f for the surface area of D41d and fixed electrode 41e.

[0044]

D41 a=D41d,
D41b=D41e -- and
D41c=D41f

[0045]

The fixed electrodes 41a-41c of the first group are arranged in the direction of Hidari from the right of a drawing along with the virtual axis 44 in order of fixed electrode 41a, fixed electrode 41b, and fixed electrode 41c, and the fixed electrodes 41d-41f of the second group are arranged in the direction of the right from Hidari of a drawing along with the virtual axis 44 in order of 41d of fixed electrodes, fixed electrode 41e, and 41f of fixed electrodes.

[0046]

Spacing L2a of fixed electrode 41b and fixed electrode 41c is smaller than fixed electrode 41a and spacing L1a of fixed electrode 41b, and spacing L2b of fixed electrode 41e and 41f of fixed electrodes is smaller than spacing L1b of 41d of fixed electrodes, and fixed electrode 41e similarly. They are L1 a=L1b and L2 a=L2b here.

[0047]

Two movable pieces 41g and 41h have the suitable configuration which can slide along with the virtual axis 44 for the fixed electrode [of the first group] a [41]-41c, and fixed electrode [41]-41f top of the second group, respectively. For example, two movable pieces 41g and 41h have on the base the configuration which has two curve projection 41g_1 and 41g_2 (1 movable piece if it is in 41h 41h_ 2), respectively, and the whole is right conductivity and they are made from metallic materials (alloy of copper, brass and copper, and iron etc.) strong against wear.

[0048]

Two movable pieces 41g and 41h are energized downward with Springs 41i and 41j, respectively. And two curve projection 41g_1 of two movable pieces 41g and 41h and 41g_2 (1 movable piece if it is in 41h 41h_ 2) are forced by the energization force on the fixed electrodes 41a-41c of the first group, and the fixed electrodes 41d-41f of the second group, respectively.

[0049]

Moreover, two spacing of two movable pieces 41g and 41h, curve projection 41g_1 and 41g_2 (1 movable piece if it is in 41h 41h_ 2) It is set up more greatly than the aforementioned L1a (L1b). Specifically If 41g of one movable pieces is made into an example, between these two metallic conductors can be made into close status only in contact with the both sides of fixed electrode 41a of the first group, and fixed electrode 41b. And it is set as suitable spacing which can make between these two metallic conductors close status only in contact with the both sides of fixed electrode 41b of the first group, and fixed electrode 41c.

[0050]

In addition, the necessity which the "whole" is right conductivity, and is made from a metallic material strong against wear does not have two movable pieces 41g and 41h. What is necessary is in short, to be able to make between these two metallic conductors into close status only in contact with the both sides of fixed electrode 41a of the first group, and fixed electrode 41b, and just to be able to make between these two metallic conductors into close status only in contact with the both sides of fixed electrode 41b of the first group, and fixed electrode 41c, in case it moves along with the virtual axis 44 (if for 41g of one movable pieces to be made into an example).

[0051]

For example, while _ of 41g of two curve projections formed in each base 1 or 41g_2 (1 movable piece

if it is in 41h 41h_ 41h_ 2) itself or its front face has well-conductivity and abrasion resistance Between two curve projection 41g_1 and 41g_2 (1 movable piece if it is in 41h 41h_ 41h_ 2) may be connected electrically.

[0052]

Two movable pieces 41g and 41h move leftward [of a drawing / the right or leftward] along with the virtual axis 44 by work of the switching actuation element 43 mentioned later each, always maintaining the concurrency condition of illustration.

[0053]

Therefore, according to the first switch element 41 which has such a configuration When there are two movable pieces 41g and 41h in an illustration location (henceforth a "neutral condition"), curve projection 41g_1 of 41g of one movable pieces and 41g_2 Since the both sides of fixed electrode 41b of the first group and fixed electrode 41c are contacted those conductors -- while being able to make between into close status -- the movable piece of another side -- since curve projection 41h_1 [41h] and 41h_2 contact the both sides of fixed electrode 41e of the second group, and 41f of fixed electrodes -- those conductors -- between can be made into close status. While in other words being able to make between fixed electrode 41a of the first group, and fixed electrode 41b into an opening condition in this case, between 41d of fixed electrodes of the second group and fixed electrode 41e can be made into an opening condition.

[0054]

a movable piece -- the case where 41g moves rightward [of a drawing] from a neutral condition -- the movable piece -- since curve projection 41g_1 [41g] and 41g_2 contact the both sides of fixed electrode 41a of the first group, and fixed electrode 41b -- those conductors -- if between can be made into close status and put in another way, between fixed electrode 41b of the first group and fixed electrode 41c can be made into an opening condition.

[0055]

At this time, although 41h of movable pieces of another side moves rightward [of a drawing] from a neutral condition at coincidence, curve projection 41h_1 of 41h of that movable piece and 41h_2 are leaving close status the fixed electrodes 41f and 41e of the second group.

[0056]

moreover -- the same -- a movable piece -- the case where 41h moves leftward [of a drawing] from a neutral condition -- the movable piece -- since curve projection 41h_1 [41h] and 41h_2 contact 41d of fixed electrodes of the second group, and the both sides of fixed electrode 41e -- those conductors -- if between can be made into close status and put in another way, between fixed electrode 41e of the second group and 41f of fixed electrodes can be made into an opening condition.

[0057]

At this time, although 41g of movable pieces of another side moves leftward [of a drawing] from a neutral condition at coincidence, curve projection 41g_1 of 41g of that movable piece and 41g_2 are leaving close status the fixed electrodes 41c and 41b of the first group.

[0058]

The C section of the lower left in drawing expresses the first switch element 41 with a circuit diagram. In this circuit diagram, the movable pieces 41g and 41h and fixed electrodes 41b and 41e form two traveling contacts of a publication in the summary of invention. Moreover, fixed electrodes 41a and 41d form NO contact given in this summary, respectively, and fixed electrodes 41c and 41f form NC contact of a publication in this summary, respectively.

[0059]

When the movable pieces 41g and 41h are in the neutral condition of illustration, NC contact (41c, 41f) is close status. Moreover, if the close status of NC contact (41c) will be dispelled, NO contact (41a) will be in close status, if 41g of one movable pieces moves rightward along with the virtual axis 44 from a neutral condition, and 41h of movable pieces of another side moves leftward along with the virtual axis 44 from a neutral condition, the close status of NC contact (41f) will be dispelled, and NO contact (41d) will be in close status.

[0060]

This first switch element 41 is what functions as a switch of "circuit 4 contact 2 Mold". That is, by work of the below-mentioned switching actuation element 43 If the movable pieces [41g and 41h] centering location is changed into the neutral condition of illustration, it will set in this neutral condition. Two of four fixed electrodes 41a, 41c, 41d, and 41f located in right-and-left both the side (41c, 41f) become NC (normally closing) contact, and the two (41a, 41d) remaining become NO (normally open) contact.

[0061]

Next, the second switch element 42 is explained. This second switch element 42 mounts 2 sets of switch mechanisms of the same structure which consists of the following members on the same base substrate (un-illustrating) as the first above-mentioned switch element 41, and is constituted.

[0062]

Namely, the U character-like members 42a and 42b by which the second switch element 42 was set up on the above-mentioned base substrate, The metal leaf-like movable pieces 42c and 42d which had the end held to the U character-like members 42a and 42b, The traveling contacts 42e and 42f attached in the metal leaf-like movable pieces [42c and 42d] other end, It is constituted including the inverse L-shaped members 42g and 42h set up on the above-mentioned base substrate, and the stationary contacts 42i and 42j attached in the inverse L-shaped members [42g and 42h] downward edge.

[0063]

the metal leaf-like movable pieces 42c and 42d incurvated the notching sections 42k and 42m formed in that part, were attached to the U character-like members 42a and 42b, and are applied, these notching sections [42k and 42m] repulsive force is used, and the traveling contacts 42e and 42f attached in the other end are always contacted to stationary contacts 42i and 42j (it is made close status) -- it is like. Therefore, stationary contacts 42i and 42j function as an NC (normally closing) contact.

[0064]

Moreover, if downward external force (force exceeding notching sections [42k and 42m] repulsive force) is applied to the metal leaf-like movable pieces 42c and 42d through the push buttons 42n and 42p respectively prepared according to the individual A metal leaf-like movable pieces [42c and 42d] tip falls, the contact between traveling contacts 42e and 42f and stationary contacts 42i and 42j (close status) is canceled, and between those contacts is made into an opening condition.

[0065]

The D section on drawing Nakamigi expresses the second switch element 42 with a circuit diagram. In this circuit diagram, two traveling contacts 42e and 42f are in close status among stationary contacts (NC contact) 42i and 42j, respectively. If downward external force is now applied to one metal leaf-like movable piece 42c, the close status of traveling contact 42e and stationary-contact (NC contact) 42i is canceled, and those contacts will be in an opening condition. Similarly, if downward external force is applied to 42d of metal leaf-like movable pieces of another side, close status with 42f of traveling contacts and stationary-contact (NC contact) 42j is canceled, and those contacts will be in an opening condition.

[0066]

Therefore, this second switch element 42 functions as a switch of "2 Circuit 2 contact mold" which has NC contact (42i, 42j) of a pair.

[0067]

Next, the switching actuation element 43 is explained. The switching actuation element 43 shown with a wavy line for convenience among drawing has the following functions 1-4.

[0068]

<Function 1>

When there is no actuation input (for example, UP actuation and DOWN actuation of the knob 3 explained at the beginning) by an operator etc., the first switch element 41 and the second switch element 42 can be maintained in the neutral condition of illustration.

[0069]

<Function 2>

It can return to the neutral condition of illustration of the first switch element 41 and the second switch element 42 immediately after discharge of the actuation input by an operator etc.

[0070]

<Function 3>

While you answer the actuation input (for example, UP actuation) of 1 by an operator etc. and you can move to an one direction (for example, left of a drawing) along with the virtual axis 44 from the neutral condition of illustration of the movable piece of 1 of the first switch element 41 (for example, a movable piece 41h), one NC contact (for example, stationary-contact 42j) of the second switch element 42 should change into an opening condition.

[0071]

<Function 4>

While you answer other actuation inputs (for example, DOWN actuation) by an operator etc. and you can move in the other directions (for example, right of a drawing) along with the virtual axis 44

from the neutral condition of illustration of other movable pieces (for example, a movable piece 41g) of the first switch element 41, NC contact (for example, stationary-contact 42i) of another side of the second switch element 42 should change into an opening condition.

[0072]

Drawing 2 and drawing 3 are the functional description Figs. of the switching actuation element 43. In drawing 2, the switching actuation element 43 has actuation means 43a of a slider 28 and similar structure in conventional switching equipment. This actuation means 43a is slid to the longitudinal direction of a drawing, following in footsteps of a motion [the knob 3 in conventional switching equipment] (UP condition <- -> neutral condition <- ->DOWN condition), and meeting the virtual axis 44 (the same thing as the virtual axis 44 of drawing 1).

[0073]

And if this actuation means 43a moves to an one direction (it considers as the left of a drawing hereafter) along with the virtual axis 44 While one movable piece (it considers as 41h of movable pieces hereafter) of the first switch element 41 will move leftward [of a drawing] along with the virtual axis 44 from the neutral condition of illustration and between 41d-41f of fixed electrodes e will be in close status NC contact (hereafter referred to as stationary-contact 42j) of another side of the second switch element 42 will be in an opening condition.

[0074]

Furthermore, if actuation means 43a slides leftward, stationary-contact 42j will be in close status, and the open direction rotation drive function of the direct current motor for window closing motion will be realized. Therefore, these intervention contacts (41h, 41d, 41e, 42j) constitute a rise side motor drive switch group (UP switch group) as one.

[0075]

Moreover, if this actuation means 43a moves in the other directions (it considers as the right of a drawing hereafter) along with the virtual axis 44 While other movable pieces (it considers as 41g of movable pieces hereafter) of the first switch element 41 will move rightward [of a drawing] along with the virtual axis 44 from the neutral condition of illustration and between fixed electrode 41a-41b will be in close status NC contact (hereafter referred to as stationary-contact 42i) of another side of the second switch element 42 will be in an opening condition.

[0076]

Furthermore, if actuation means 43a slides rightward, stationary-contact 42i will be in close status, and the closed direction rotation drive function of the direct current motor for window closing motion will be realized. Therefore, these intervention contacts (41g, 41a, 41b, 42i) constitute a down side motor drive switch group (DOWN switch group) as one.

[0077]

In drawing 3, this drawing is one switch group's (it considers as the expedient top of explanation, and UP switch group) explanatory view of operation. The X-X cross section and the Y-Y cross section show the fracture surface in drawing 2 . About the first line expresses the neutral condition of an initial valve position. In the state of this neutrality, 41h of movable pieces of the first switch element 41 is located between central fixed electrode 41e and 41f of right end fixed electrodes, and they make between these two electrodes close status. Moreover, push button 42p of the second switch element 42 is in the condition of having carried out checking and verifying to the inferior-surface-of-tongue crevice of actuation means 43a, and having been raised in it, it is not reversed caudad and 42d of metal leaf-like movable pieces is in close status between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces, and stationary-contact 42j.

[0078]

If it shifts to UP condition from this condition (the shift to left of actuation means 43a is started), it will set about to the second line immediately after UP condition shift first. Although 41h of movable pieces of the first switch element 41 is located in the location of the first above-mentioned stroke between continuation, i.e., central fixed electrode 41e, and 41f of right end fixed electrodes and between these two electrodes is made into close status Since push button 42p of the second switch element 42 shifted to the thick section, and will be depressed from the inferior-surface-of-tongue crevice of actuation means 43a and 42d of metal leaf-like movable pieces is bent caudad, The close status between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces and stationary-contact 42j is canceled, and it will be in an opening condition.

[0079]

Subsequently, if UP condition progresses further and it goes about into the third line, they will change between central fixed electrode 41e and 41f of right end fixed electrodes into an opening condition while 41h of movable pieces of the first switch element 41 is located between fixed

electrode 41e of 41d of left end fixed electrodes, and a center and they make between these two electrodes close status. At this time, push button 42p of the second switch element 42 has still shifted to the thick section from the inferior-surface-of-tongue crevice of actuation means 43a, and since the condition that 42d of metal leaf-like movable pieces was reversed caudad is maintained, the opening condition is maintained between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces, and stationary-contact 42j.

[0080]

And although 41h of movable pieces of the first switch element 41 is located in the location of the third above-mentioned stroke between continuation, i.e., fixed electrode 41e of 41d of left end fixed electrodes, and a center, and between these two electrodes is made into close status if UP condition progresses further and a last line goes about into (the fourth line) Push button 42p of the second switch element 42 carried out checking and verifying to the inferior-surface-of-tongue crevice of actuation means 43a, and will be raised in it. 42d of metal leaf-like movable pieces will return horizontally, and between 42f of traveling contacts attached at the tip of 42d of metal leaf-like movable pieces and stationary-contact 42j will be in close status.

[0081]

In addition, although explanation of drawing 3 showed the shift process from a neutral condition to "UP condition", its same is said of the shift process to a "DOWN condition." In the case of the shift process to a "DOWN condition", it is each sign under above-mentioned explanation,

41h -> 42g

41d->41a

41e->41b

41f->41c

42d->42c

42j->42i

42f->42e

42p->42n

What is necessary is just to read.

[0082]

Drawing 4 is rotation (normal rotation and inversion) of the direct current motor for window closing motion constituted with the application of the switching equipment 40 of the gestalt of this operation, and the circuit diagram of a halt system. In this drawing, it is conventionally different from a system in that the +B line 17 is a positive-electrode side power source (+B line of the electric system system for cars), and the applied voltage of the +B line 17 is a high voltage (supply voltage: 36V), for example, the thing of 42V system electric system system, from 14V system electric system system although the grand line 18 is a negative-electrode side power source (grand line of this system).

[0083]

In drawing 4, drawing when drawing in case (a) is for example, in a DOWN condition, and (d) return to a neutral condition from a DOWN condition, (b), and (c) are drawings when being in the middle transient. When it is in a DOWN condition, each contact of the first switch element 41 and the second switch element 42 is in the condition about corresponding to the fourth line of drawing 3. That is, while between the movable piece (41g) of the first switch element 41 and NO contacts (41a) and between a movable piece (41h) and NC contacts (41f) are close status, two NC contacts (42i, 42j) of the second switch element 42 are close status.

[0084]

For this reason, since the potential (0V) of the grand line 18 is applied to the other end side driving input of a direct current motor 2 while the potential (+42V) of the +B line 17 is applied to the end side driving input of a direct current motor 2, a direct current motor 2 rotates to an one direction (direction which opens a window).

[0085]

In this condition, if a DOWN condition is canceled (i.e., if a finger is lifted from the knob 3 explained at the beginning), it will shift to the condition of drawing 4 (b). In this condition, although the contact of the first switch element 41 remains as it is, both two NC contacts (42i, 42j) of the second switch element 42 will be in an opening condition, and connection between the end side driving input of a direct current motor 2 and the grand line 18 will be severed.

[0086]

Next, while the movable piece (41g) of the first switch element 41 and the close status between NO contacts (41a) are dispelled shifting to the condition of drawing 4 (c) and maintaining the opening

condition of two NC contacts (42i, 42j) of the second switch element 42, between a movable piece (41g) and NC contacts (41c) will be in close status.

[0087]

And finally, it will shift to the condition of drawing 4 (d), both two NC contacts (42i, 42j) of the second switch element 42 will be in close status, the grand line 18 is connected to the driving input by the side of the end of a direct current motor 2, and the other end, and rotation of a direct current motor 2 stops.

[0088]

now, un-arranging [of the conventional technique explained at the beginning] -- a direct current motor 2 -- the neutral condition from UP condition -- or when making it return to a neutral condition from a DOWN condition, it suited a high current flowing into the contact concerned with the change of a contact, and causing a contact damage. In the gestalt of this operation, since the second switch element 42 is changed into an opening condition and the path of the high current concerned was intercepted to coincidence before switching the contact of the first switch element 41 or, this high current does not flow in and the contact damage of the first switch element 41 can be avoided. Although breadth incidentally becomes large a little in order to add two circuits of NC contacts, since it is not necessary to extend a contact gap, neither large enlargement of switching equipment 40 nor aggravation of responsibility is also caused. Furthermore, it is also possible to utilize for the increment in a contact gap the tooth space which wrote the second switch element 42 as NC contact, and had NO contact.

[0089]

In addition, with the gestalt of the above operation, although the second switch element 42 is made into the thing of "circuit 2 contact 2 Mold", it is not limited to this. You may be the thing of "circuit 1 contact 1 Mold."

[0090]

Drawing 5 is a circuit diagram at the time of using the second switch element 42 as "1 Circuit 1 contact mold." The difference with the gestalt of said operation connects two NC contacts (41c, 41f) of the first switch element 41 inside a switch, and is in the point connected to the grand line 18 through one movable piece (42e or 42f) of the second switch element 42, and one NC contact (42i or 42j).

[0091]

<The gestalt of operation concerning invention according to claim 2>

Or the second switch element 42 of "circuit 2 contact 2 Mold" may be connected to a positive-electrode side power source. Drawing 6 is the circuit diagram. The difference with the gestalt of said operation While making one the second movable piece (42e) and NC contact (42i) of the switch element 42 intervene between one NO contact (41a) of the first switch element 41, and the +B line 17 It is in the point of having made the second movable piece (42f) and NC contact (42j) of another side of the switch element 42 intervening between NO contact (41d) of another side of the first switch element 41, and the +B line 17.

[0092]

Or it is good also considering the second switch element 42 in drawing 6 as "1 A circuit 1 contact mold." Drawing 7 is the circuit diagram, and the difference with drawing 6 connects two NC contacts (41c, 41f) of the first switch element 41 inside a switch, and is in the point connected to the +B line 17 through one traveling contact (42e or 42f) of the second switch element 42, and one NC contact (42i or 42j).

[0093]

In any case (drawing 6 or drawing 7), before any one of the NO contacts (41a, 41d) of the first switch element 41 shifts to an opening condition from close status, said NC contact (42i, 42j) of the second switch element 42 which leads to the one NO contact concerned should just be changed into the opening condition. Since it moreover is not necessary to intercept the path of a high current, to avoid the contact damage of the first switch element 41, and to extend a contact gap, neither enlargement of switching equipment nor aggravation of responsibility is also caused.

[0094]

<The gestalt of operation concerning invention according to claim 3>

Or it is good also considering the first switch element 41 as "4 A circuit 4 contact mold." Drawing 8 is the circuit diagram. The difference with the gestalt of said operation The point of having excluded two NC contacts (41c, 41f) of the first switch element 41, The point of having enabled it to connect alternatively the end side driving input of a direct current motor 2, and other end side driving input to the +B line 17 through two NO contacts (41a, 41h) of the first switch element 41, And it is in the

point of having enabled it to connect alternatively the end side driving input of a direct current motor 2, and other end side driving input to the grand line 18 through two NC contacts (42i, 42j) of the second switch element 42. What is necessary is just to change into the opening condition NC contact (42i, 42j) of the second switch element 42 which leads to the NO contact, before making those NO contacts (41a, 41h) into close status in order to avoid the damage of NO contact (41a, 41h) of the first switch element 41.

[0095]

Gestalt [of operation of others / <] >

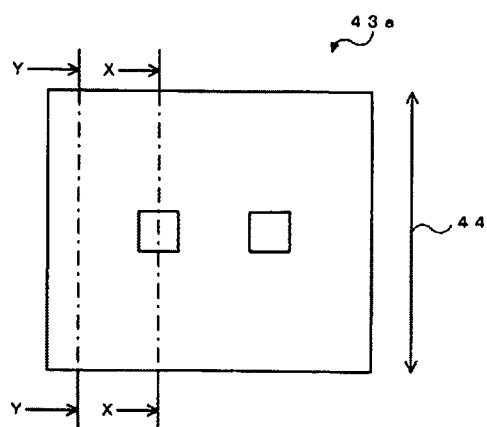
Or with the gestalt of each above-mentioned operation, although unitization of the first switch element 41 and the second switch element 42 is carried out to one, the thought of this invention is not limited to this mode. For example. The first unit 51 which dedicated the first switch element 41 as shown in drawing 9 , the second unit 52 which dedicated the second switch element 42 -- annexing -- the switch control unit (if it is in the first unit 51 -- up projection 51b of slider 51a --) of each units 51 and 52 If it is in the second unit 52, two crevices 50a and 50b of a knob 50 (thing equivalent to the knob 3 in said conventional technique) may be made to carry out the checking and verifying of the projection 52a for actuation.

[0096]

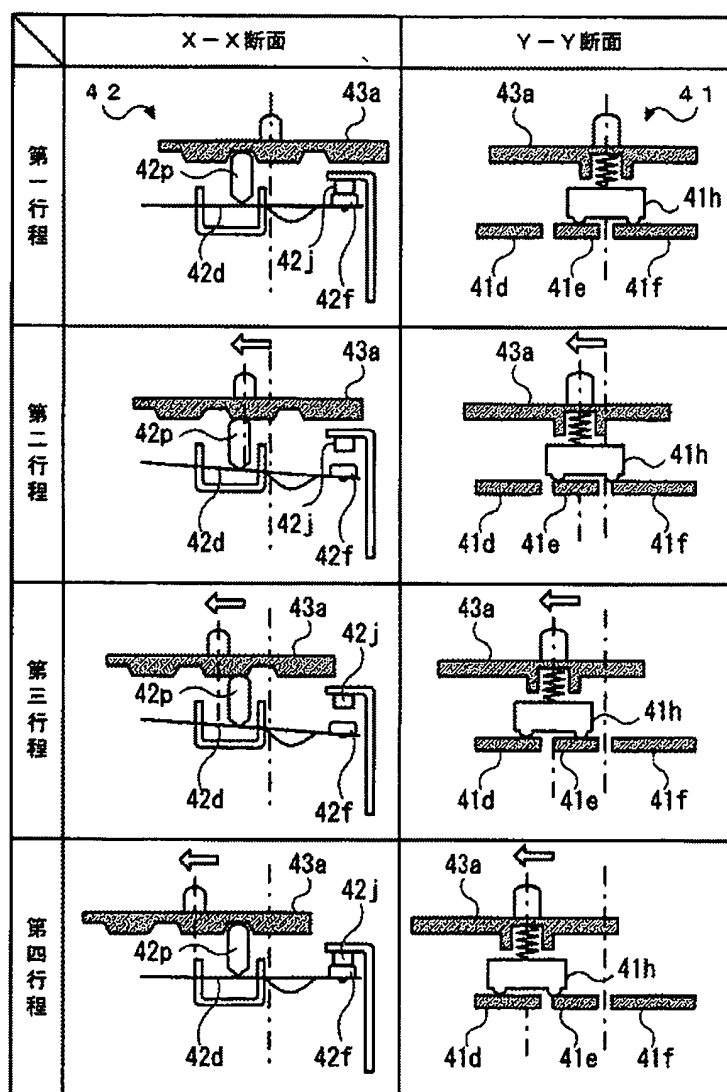
[Translation done.]

3. In the drawings, any words are not translated.

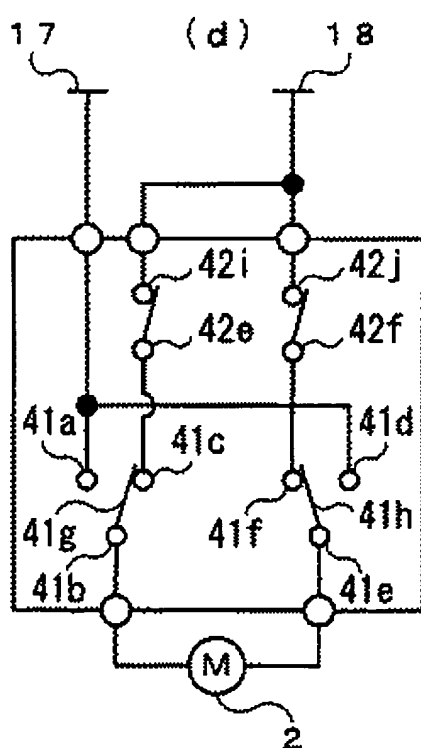
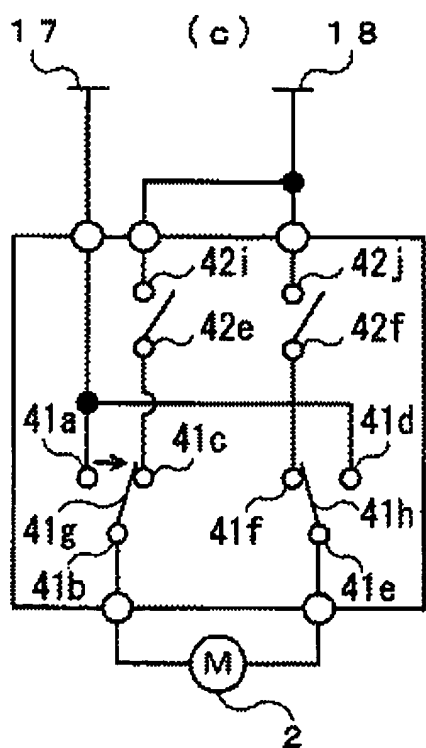
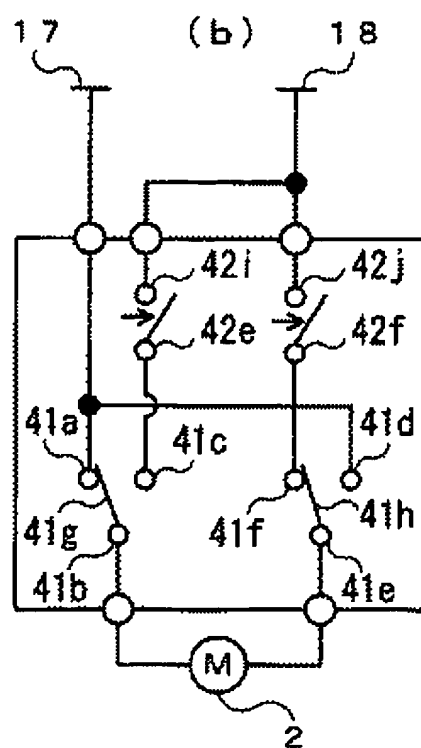
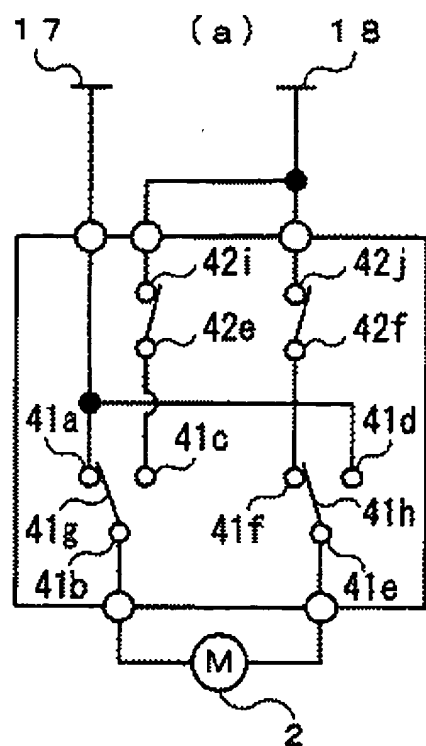
[Drawing 2]



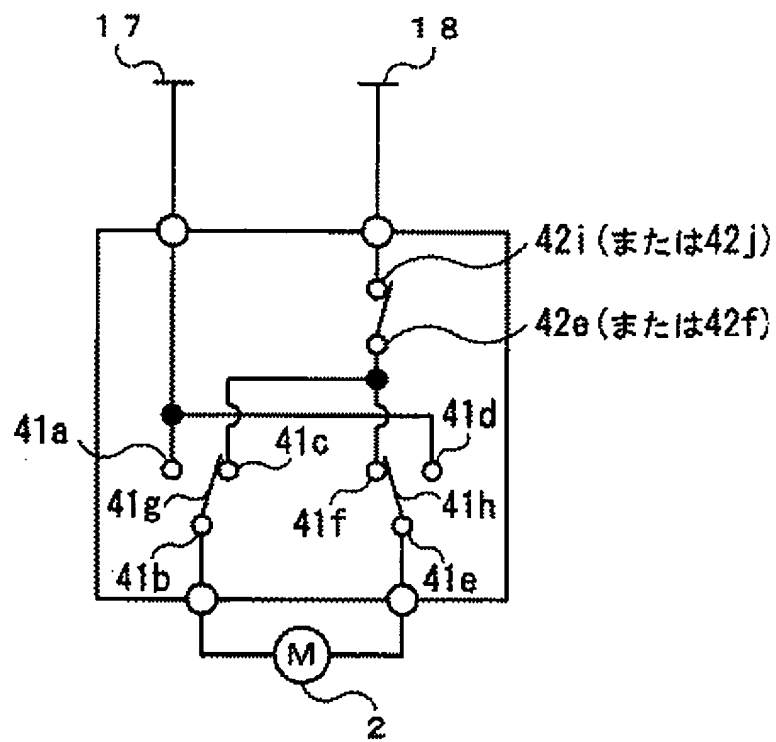
[Drawing 3]



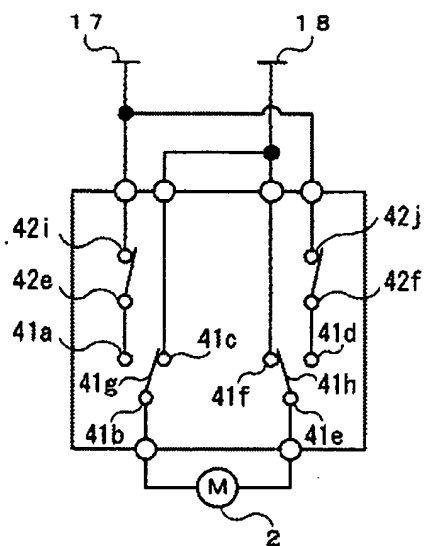
[Drawing 4]



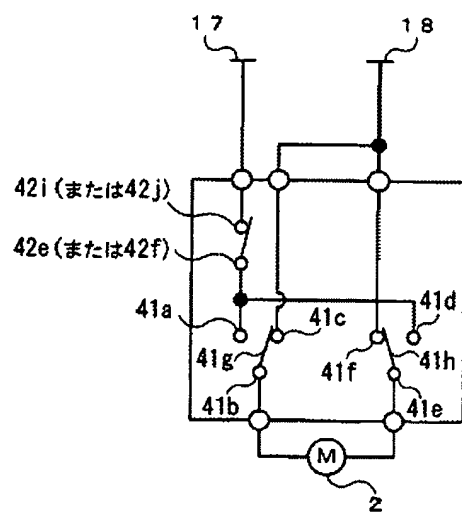
[Drawing 5]



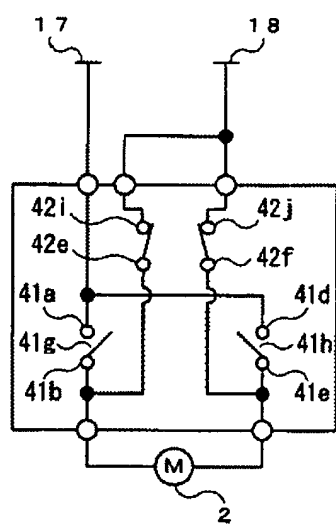
[Drawing 6]



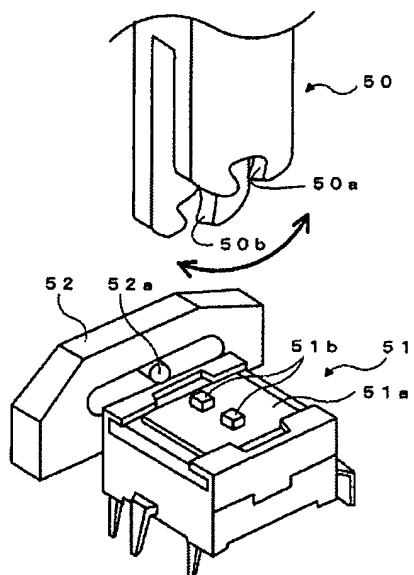
[Drawing 7]



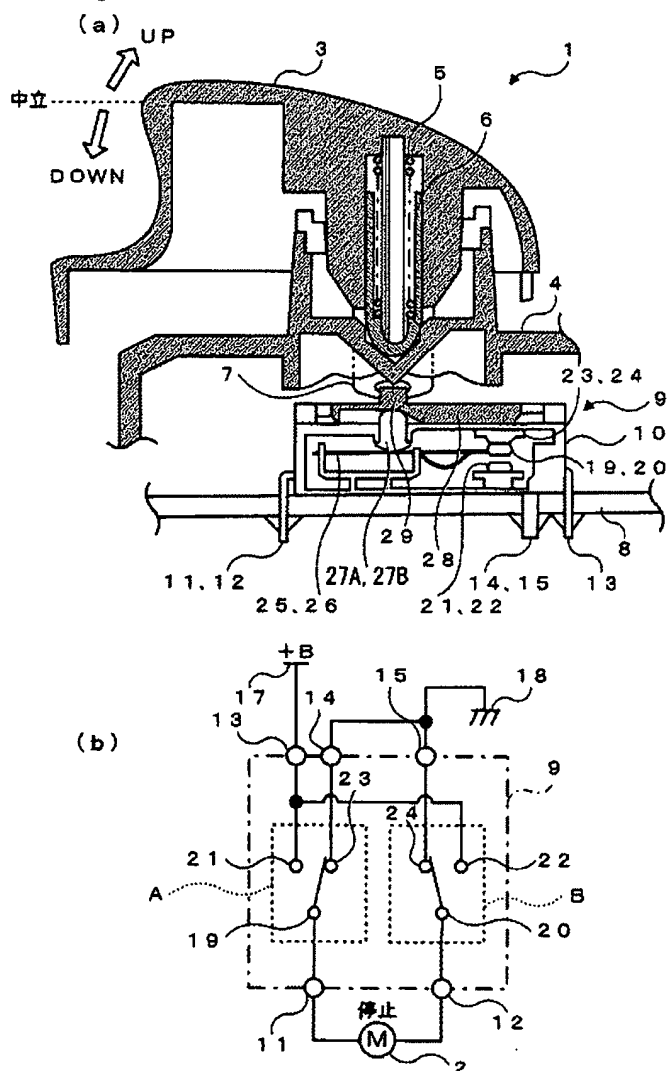
[Drawing 8]



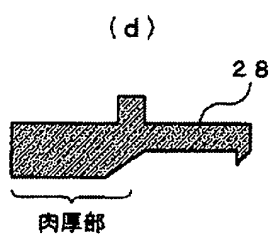
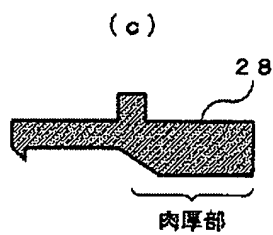
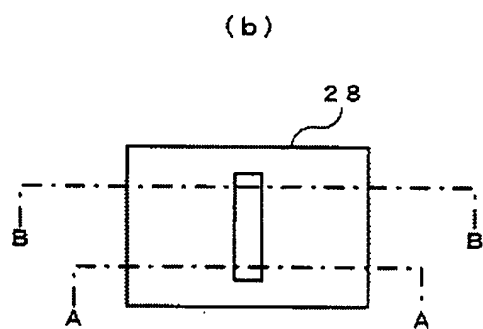
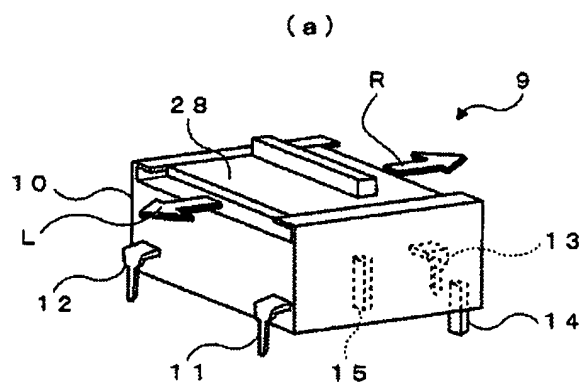
[Drawing 9]



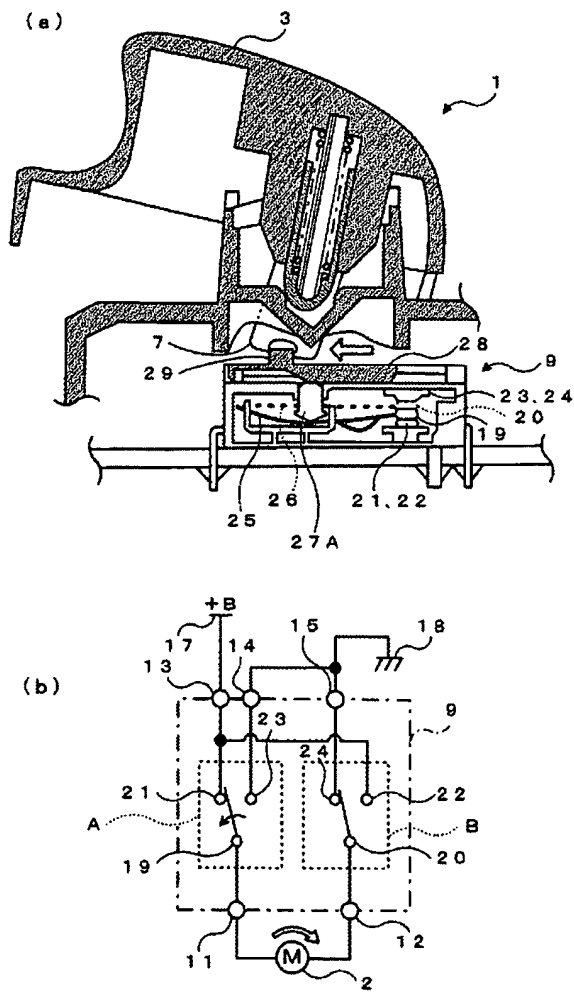
[Drawing 10]



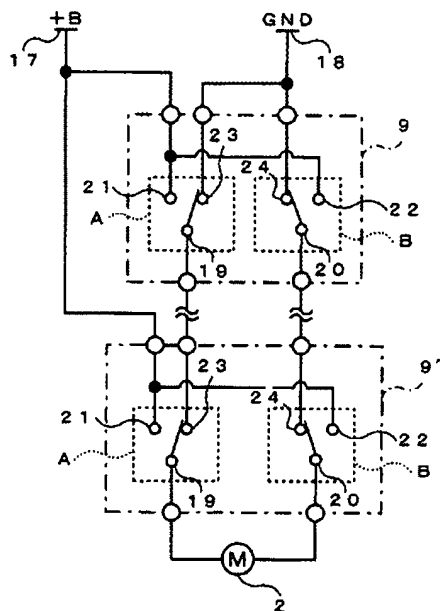
[Drawing 11]



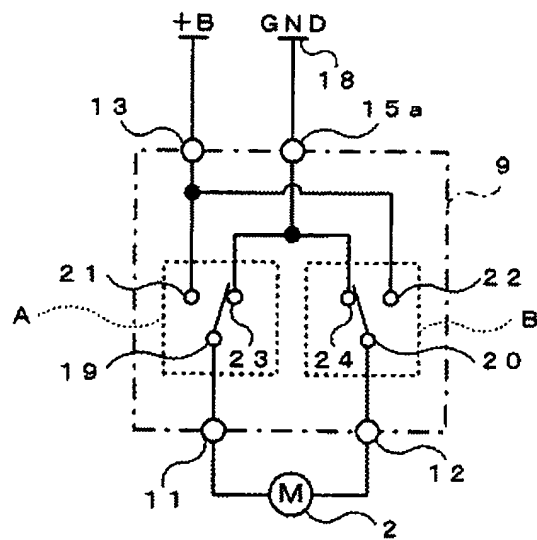
[Drawing 12]



[Drawing 13]



[Drawing 14]



[Drawing 15]

